

Catheter helps get oxygen to blood when lungs aren't working

April 7 2009, By Sarah Vos

When Kelli Justice walked into her baby's room at Kentucky Children's Hospital, it was terrifying.

All she could see were the tubes and machines that were hooked up to her newborn son, Tristan, to help his malfunctioning lungs.

A [catheter](#) had been placed into Tristan's neck and was sewn onto his scalp to hold it in place. He was surrounded by tubes, some of them filled with blood. He couldn't be held.

"He just looked so pitiful," Justice said.

But Tristan was being kept alive by a device invented by two University of Kentucky physicians.

With Tristan, the device was being used for the first time in Kentucky and only the third time nationally.

The catheter in his neck was invented by Dr. Joseph Zwischenberger, chairman of UK's Department of Surgery, and Dr. Dongfang Wang, who directs UK's Artificial Organ Laboratory. It was helping take [carbon dioxide](#) out of Tristan's blood and put [oxygen](#) back in, and it was working beautifully.

"The child just sailed," said Zwischenberger, who watched the procedure but was not involved in the decision to use the catheter. The device is

called the Avalon Elite Bi-Caval Double Lumen Catheter, and it helps patients get oxygen into their blood when their lungs aren't working.

Tristan Ray Justice came to Kentucky Children's Hospital from Pikeville, where he was born.

But Tristan didn't cry when he was born. Doctors at Pikeville Medical Center spanked him hard, said his mother, but still, he didn't cry.

Tristan had inhaled meconium, a baby's first stool, as he was born, and it coated the inside of his lungs, slowly suffocating him.

True meconium aspiration, which Tristan had, is rare. Babies are born in meconium-stained [amniotic fluid](#) about 8 percent to 20 percent of the time, said Dr. Hubert Ballard, a neonatologist at Kentucky Children's who managed Tristan's case. Only 4 percent of those babies develop meconium aspiration.

Tristan was flown to Lexington. Doctors first tried to treat Tristan with medication and a ventilator, said Ballard. But Tristan stayed blue. "He really had almost no response to everything we had done," Ballard said.

So Ballard decided to put Tristan on extracorporeal membrane oxygenation, or ECMO, as the procedure is called.

ECMO is commonly used on children whose lungs are barely working. It requires the insertion of two catheters. But when using the Avalon Elite, only one is needed because it does the job of both.

For babies such as Tristan, ECMO comes with two big risks: The baby could develop bleeding on his brain as a result of the blood thinners the procedure requires, or he could develop an infection.

But if doctors didn't do the procedure, Tristan had a one in five chance of survival, Ballard said.

So early March 4, Ballard called in Dr. Sean Skinner and Dr. Joseph Iocono, pediatric surgeons, to insert the Avalon Elite.

The two surgeons had placed ECMO catheters before, but they had tried the new catheter only in UK's animal lab, where they practiced on sheep, Zwischenberger said.

The catheter went in easily, and the surgeons placed it in the heart correctly on the first try, Zwischenberger said. The entire procedure took less than an hour.

The new catheter, which was released in January, does a better job getting oxygen into the blood than the two-catheter method, Zwischenberger said. In addition, the old catheters are harder for doctors to place because they often kink. The new catheter is reinforced with wires to resist kinking.

And unlike the old catheters, the new one can be used on adults. Last month, a man in California was put on the catheter while waiting for a lung transplant, Zwischenberger said.

After the new catheter was used on Tristan, his skin soon lost its blue tinge and gained the healthy pink of a baby who is getting enough oxygen, Zwischenberger said.

Tristan was on ECMO for six days and eight hours while his lungs healed, Ballard said.

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Citation: Catheter helps get oxygen to blood when lungs aren't working (2009, April 7) retrieved 24 April 2024 from <https://medicalxpress.com/news/2009-04-catheter-oxygen-blood-lungs.html>

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