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Doctors grow organs from patients' own cells

Seven living with bladders from new process

HADDAM NECK, Connecticut (CNN) -- Kaitlyne McNamara no longer worries about feeling different at school.

The 16-year-old was born with spina bifida, a congenital birth defect that stunts brain and spinal cord development. The disease left her with a crippling jumble of nerves jutting out from the base of her spine.

Kaitlyne had dozens of major surgeries as a child, but then another problem surfaced: Her bladder was not functioning properly.

"If she drank a cup of water or a cup of juice, her bladder's pressures were at such an intense point she would have something called a bladder burst," recalled her mother, Tracy McNamara.

Accidents caused by the bladder pressure were another concern.

"At my school they make fun of you ... and I didn't want to become singled out because I was different from everybody else," Kaitlyne said.

A new procedure pioneered at Wake Forest University in North Carolina has apparently solved the problem for Kaitlyne and six other patients.

Scientists grew new bladders from the patients' own cells, which were then transplanted back into the patients' bodies.

Dr. Anthony Atala and his colleagues described the experiment as a long-term success for the seven patients, who ranged from toddlers to teenagers.

The patients in Atala's study all have spina bifida, which puts them at risk for kidney damage and leads to problems with urinary control. The conventional way to repair the condition is to use a piece of intestine to create a new bladder.

But that procedure can be risky, Atala said.

"When you put a piece of intestine to function as a bladder, you start having absorption of things you shouldn't be having, and this may lead to problems with bone growth, mucus production, certain metabolic problems ... even cancer," he said.

In the new procedure, doctors extract muscle and bladder cells from a small piece of the patient's own bladder. The cells are grown in a Petri dish, then layered onto a three-dimensional mold shaped like a bladder.

In a few weeks, the cells produce a new bladder, which is implanted into the patient. Within a few more weeks, the new bladder has grown to normal size and has started functioning.

Atala is working to grow 20 different tissues and organs, including blood vessels and hearts, in the laboratory, according to the university.

"We're not using any type of stem cell population or cloning techniques, but mainly the patient's own cells that we're using to create these organs and put them back into the patient," Atala told CNN.

Because the bladders are grown from a patient's own cells, there is no risk of rejection, as in a traditional transplant.

More studies will be needed before growing replacement organs becomes routine, but Atala said the procedure eventually might help ease shortages of organs available for transplant.

"Over the last decade, the number of patients that actually ended up on the wait list for an organ transplant increased threefold, and in the same time period the number of transplants remained basically flat," he said. "So a lot of these regenerative medicine technologies do hold some promise in at least making a dent in some of these shortages."

If you ask Kaitlyne McNamara, the technique has already fulfilled its promise.

"I'm happy. I'm like, 'I can run around and do a lot of things that I wasn't able to do because I was always afraid that I was going to have an accident or something,'" she said. "Now I can just go and go out with my friends. Go do whatever I want and not have to have worries about it."

CNN's Stephanie Smith contributed to this report.

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