First elbow transplant performed between same patient's arms

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UCSF Health doctors have performed a first-of-its-kind elbow transplant between the same patient's arms. Experts say the April 2016 surgery could transform treatment for trauma patients, injured veterans and others with elbow and joint conditions.

"The fact that the donor elbow came from the same patient—a mirror image elbow—is what makes this procedure unique and the first of its kind," UCSF Health surgeon Dr. Lisa Lattanza said of the April 15 transplant on 37-year-old Reginald Cook.

A Novel Surgery

The 12-hour procedure at UCSF Medical Center at Parnassus involved five surgeons, two orthopaedic upper-arm extremity specialists and three plastic/microvascular surgeons. The doctors worked on both of Cook's arms simultaneously to remove and connect bone, muscles, blood vessels, nerves and skin.

"This surgery was a bit like ballet," said Lattanza, who led the team that transplanted Cook's left elbow into his right arm. "Everybody knew their part and performed flawlessly at just the right time."

A 2009 car accident left Cook, of El Paso, Texas, in a coma for months. He sustained brain trauma, several broken bones in his neck and paralysis in his legs, necessitating a wheelchair.

Cook also suffered a complete detachment of the brachial plexus, a network of nerves, in his left arm and failed to recover any nerve function. Despite multiple reconstructive procedures to repair a shattered elbow in his right arm, Cook found himself with no elbow joint and only half the bone in that limb after an implanted elbow joint became infected.

As a result, he could no longer control the arm for even simple tasks like eating, although he did have good movement of his right hand. Cook relied on his sister and a visiting nurse for care.

Doctors examine Reginald Cook's arm before his elbow transplant surgery.

An Unusual Collaboration

"He did not have use of either arm," said Dr. Eric Sides, Cook's orthopaedic surgeon in Texas who worked with Lattanza on the case. "His right arm was basically frozen at 90 degrees, and his left arm was completely nonfunctional."

Sides, an assistant professor at Texas Tech University Health Sciences Center El Paso, first met Lattanza in the mid-1990s when the two were residents at the University of Missouri-Kansas City. He contacted Lattanza after Cook suggested the idea of an elbow transplant, hoping to regain use of one of his arms.

Sides and Cook traveled to San Francisco to meet with Lattanza in November 2015. The procedure was potentially risky since Cook could lose function in his right hand, due to possible nerve damage during the operation, as well as scar tissue from the previous infection and surgeries.

In the months leading up to the procedure, Lattanza worked with UCSF colleagues and consultants around the world to devise the novel surgery, which would remove Cook's left arm above the elbow and transplant that elbow to his right arm. The team also used 3-D computer modeling software from Belgian company Materialise to help plan the surgery.

The UCSF Health surgical team included Dr. Scott Hansen, Dr. Charles Lee, Dr. Michael Terry and Dr. Samantha Piper. Alyssa Ricker, principal clinical engineer for Materialise, served as imaging consultant.

Despite extensive planning, Lattanza and her team made adjustments on the fly during the surgery because Cook's anatomy had changed since his initial visit.

"The bones came back together well, the joint is working well and the flap is alive," Lattanza said of Cook's surgery. "He's moving his right hand, so there was no nerve damage during the operation. We're all very hopeful on the outcome."

A UCSF Health surgical team performs Reginald Cook's elbow transplant.

She added that, one month after the transplant, Cook was able to lift his hand to his face and mouth on his own.

Hope for the Future

"I'm now feeling touch and sensations," said Cook, who was scheduled to stay in San Francisco for several weeks after the surgery, while doctors monitored his progress.

Once Cook returns to Texas, Sides says he hopes his patient can regain the ability to dress and feed himself over the next year—and potentially even walk again.

"If we can make the arm strong enough, he should be okay to walk with a cane," Sides said.

Cook will restart physical therapy in his right arm, and his left arm now has suitable anchoring for a prosthesis if desired, his doctors said.

"I can't wait to be independent and give my 14-year-old daughter a big hug," said Cook, who hopes to become a motivational speaker. "This has been life changing for me."

Provided by University of California, San Francisco

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