

New Surgical Technique May Reverse Paralysis, Restore Use of Hand

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Justin M. Brown, MD, reconstructive neurosurgeon at UC San Diego Health System, is one of only a few specialists in the world who have pioneered a novel technique to restore hand function in patients with spinal cord injury. In a delicate four-hour procedure, Brown splices together tiny nerve endings, only one millimeter in width, to help restore hand mobility. Most patients return home 24 hours after surgery.



Justin Brown, MD, neurosurgeon, UC San Diego Health System

“Even if a patient appears to have lost total hand function, as long as there is some nerve in the arm or shoulder under the patient’s control, some mobility may be regained,” said Brown, director of the Neurosurgery Peripheral Nerve Program and co-director of the Center for Neurophysiology and Restorative Neurology at UC San Diego Health System. “With a nerve transfer, the goal is to reverse paralysis. This means achieving functional grasp and release so that patients can eat independently, operate a computer or hold a loved one’s hand.”

Brown and his team treat hand impairments at cervical level 5 and below. Operating under a microscope, Brown disconnects the damaged nerve and reconnects it to a healthy one. The healthy nerve is taken from underneath the muscles of the upper arm and then connected to a nerve branch that provides finger function. In contrast to muscle transfers, nerve transfers allow whole muscle groups to be restored in the arm without visibly changing the body’s anatomy.

“The nerves grow at a rate of 1 millimeter per day,” said Brown, who is also founding member and first president of the International Society for Restorative Neurology. “Over a period of six to 12 months, patients can essentially wake up their arms and hands and return to a satisfying level of functionality and improved quality of life.”

Brown said that patients occasionally experience temporary weakness where the original healthy nerve is taken. These muscles, however, can recover their original strength. Casting and immobilization is seldom needed after the surgery. He added that the overall result is that multiple hand functions can be restored with a single transplant.

“The recovery of hand function is consistently rated as the highest priority for persons with quadriplegia,” said Brown. “While nerve transfers take longer to heal so that axons can regenerate, patients often experience better long-term biomechanical outcomes.”

In the United States there are approximately 300,000 people living with spinal cord injuries with 12,000 new injuries occurring each year. More than half of these injuries result in neck-level injuries that lead to loss of hand and arm function. Brown said this technique may also be offered in select cases to patients with paralysis as a result of trauma, stroke, or brain injury.

Brown earned his medical degree from the Eastern Virginia Medical School in Norfolk. He completed a surgical internship and neurosurgical residency at Baylor College of Medicine in Houston and a peripheral nerve fellowship in the Division of Plastic and Reconstructive Surgery at Washington University School of Medicine. He was formerly co-director of the Peripheral Nerve Center at Washington University in St. Louis.

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