Medical experts restore movement and autonomic function in patients with complete paralysis

January 31 2019

There are more than 290,000 people estimated to be living in the United States with a spinal cord injury. Previously, it has been shown that it is possible to restore some function to young and healthy patients within a few years of injury. Now, researchers show spinal cord stimulation can immediately restore some voluntary movement and autonomic functions such as cardiovascular, bowel, and bladder years after a paralyzing injury without any significant rehabilitation.

"This was an opportunity to use epidural stimulation, combine my background in mathematics, collaborate with people from multiple disciplines including biomedical engineering and set up a truly innovative trial," said Dr. David Darrow, a neurosurgery resident at the University of Minnesota Medical School and a lead investigator for the E-STAND Clinical trial. He is also a senior neurosurgery resident at Hennepin Healthcare and University of Minnesota Medical Center. "We wanted to push the envelope for patients. Once we determined it worked, we moved on to knocking down other barriers to translation to patient care."

In a study recently published in the *Journal of Neurotrauma*, Darrow and his colleagues implanted the first series of female patients who both suffered devastating traumatic spinal cord injury. Both patients had no lower body function whatsoever and MRIs showing very little residual spinal cord at the level of injury. The two women were five and ten years

from injury and in their 5th and 6th decade of life, which is much closer to the average patient with spinal cord injury compared to the work of other investigators.

"Enabling someone to move her legs more than 10 years after being paralyzed from spinal cord injury has been one of the greatest moments of my career," said Uzma Samadani, MD, Ph.D., Associate Professor in the Department of Neurosurgery University of Minnesota Medical School and Neurosurgeon with Hennepin Healthcare. "I am grateful to my colleagues for their mutual hard work during the 2 years it took to get from idea to the first operation."

In this study researchers expanded the inclusion guidelines of who could receive epidural stimulation.

"We believe that we are studying a population that is much closer to the general population of patients with spinal cord injury," said Darrow. "We have opened the doors to so many more patients with traumatic spinal cord injury."

"While we are excited for all this could mean for patients, there is still a lot of research to be done, both with this therapy and through other avenues, many of which we are studying at the University of Minnesota," said Ann M. Parr, MD, Ph.D., Assistant Professor in the Department of Neurosurgery at the University of Minnesota Medical School. Dr. Parr has an active translational spinal cord injury research laboratory at the Stem Cell Institute.

More information: David Darrow et al. Epidural Spinal Cord Stimulation facilitates immediate restoration of dormant motor and autonomic supraspinal pathways after chronic neurologically complete spinal cord injury, *Journal of Neurotrauma* (2019). DOI: 10.1089/neu.2018.6006