

Improvements in stroke treatment could save more lives

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Yale researchers have found ways to treat stroke patients that may otherwise be untreatable.

In a study published in the *Journal of Neurosurgery*, principal investigators Yale's Charles Matouk, MD, associate professor of neurosurgery, and Nils Petersen, MD, Ph.D. associate professor of neurology, show that a method called direct carotid puncture (DCT) offers a life-saving and surprisingly safe alternative to the standard mechanical thrombectomy for patients with difficult-to-access arteries.

Americans have more than 795,000 strokes every year, leading to 140,000 deaths annually. Treatment options depend on when the stroke patient is brought to the hospital.

During the first four-and-a-half hours after a stroke starts, patients can receive tissue plasminogen activator (tPA), a protein that breaks down [blood clots](#). But after that, it's too late for tPA, as the risk of bleeding becomes too high. For the most severe subtype of stroke, caused by a blood clot blocking a major artery in the brain, doctors strive to combine tPA with thrombectomy, a procedure where a stent is used to remove the clot causing the stroke. Surgeons get the stent to the brain by threading a catheter through a patient's artery, usually from the groin. While this works well in many cases, it can be a long and tricky journey.

"As we age, the blood vessels become more twisted, like the knots of a tree, and it becomes more difficult to navigate up to the head," says Dr. Matouk. For about five to 10 percent of [stroke patients](#), this artery anatomy problem makes mechanical thrombectomies nearly impossible.

"We know that time is brain for the patient," says Dr. Petersen. Every minute a stroke goes untreated, 1.9 million neurons die, so immediate treatment is key to saving lives and avoiding disability.

For their study, Dr. Matouk and Dr. Petersen wanted to see if DCT could be a safe alternative to accessing the brain from the groin. This procedure involves inserting a catheter through a patient's neck, right

into the carotid artery, and then doing a thrombectomy.

DCT would allow doctors to access the clot much more quickly and bypass an abnormal vascular system. But the procedure had long been considered riskier than other routes to doing a thrombectomy. Dr. Matouk's own positive experiences doing DCT as a rescue approach when other procedures had failed inspired him and Dr. Petersen to take a closer look at the technique.

For the study, the two researchers looked at the attempted thrombectomies at Yale New Haven between 2015 and 2018 to compare those who had the procedure aborted because of the anatomy of their arteries against those who received a DCT-enabled thrombectomy.

The results were promising: surgeons could complete 19 of the 20 DCT procedures they tried to perform. Of this group, 84 percent of the patients (16 people) had clots successfully removed.

Overall, the DCT patients did better than the 17 patients who did not get a thrombectomy, including achieving better scores on the [stroke](#) assessment scale set out by the National Institutes of Health.

"Our data are very encouraging," says Dr. Petersen. "They showed us that not only are we able to use this rescue approach safely, we're able to get the clot and get the blood vessel open. And it appears people have better outcomes than if you do nothing."

The team used previous research literature to inform their approach and make adjustments to improve safety, including choosing a puncture site low on the neck, using ultrasound as a guide, and stopping bleeding by applying pressure. These changes have been formalized into the standard workflow for the Yale team.

With more study, DCT could become part of the standard of care for [ischemic stroke](#) everywhere, offering more hope for older patients.

"We know the natural course of this disease is just devastating," says Dr. Petersen. "This approach offers new hope for patients to restore function when they would otherwise inevitably suffer massive, permanent strokes."

More information: Branden J. Cord et al. Direct carotid puncture for mechanical thrombectomy in acute ischemic stroke patients with prohibitive vascular access, *Journal of Neurosurgery* (2020). [DOI: 10.3171/2020.5.JNS192737](#)

Provided by Yale University

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