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A Breakthrough Stroke Treatment Can Save Lives—If It's Available

Access to a 'thrombectomy,' which can forestall damage, depends where patients live

By Thomas M. Burton

Minutes mattered to two Atlanta-area residents who showed severe-stroke symptoms last autumn. The right treatment done quickly can help prevent brain damage.

An ambulance raced a 74-year-old man to a hospital nearby that wasn't an institution capable of offering the most-advanced procedure. He arrived Oct. 30 at 9:30 a.m. with right-side weakness, unable to speak.

Those symptoms should have been enough for personnel to immediately transfer him to Grady Memorial Hospital, says Raul G. Nogueira, Grady's chief of stroke endovascular therapy, who treated him and recounted the case. Grady can perform a procedure called "thrombectomy" that is gaining favor for its ability to pre-empt brain damage in many patients.

Instead, the man got two scans. By the time a helicopter transferred him to Grady at around 2 p.m., a "good outcome was nearly impossible," says Dr. Nogueira. The patient "is expected to have lifelong severe disabilities and not be able to care for himself."

On Nov. 1, a 77-year-old woman was discovered on her bedroom floor with similar symptoms at 9:30 a.m. She arrived by ambulance directly at Grady and underwent a thrombectomy around noon, says Dr. Nogueira, and is "back to normal."

The thrombectomy is beginning to transform stroke treatment. Using it, a doctor pulls clots from the brain. Leading stroke doctors concluded in a February 2016 analysis in the medical journal The Lancet that 2015 stroke studies showed 38 out of 100 patients treated

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with thrombectomy "will have a less disabled outcome" than with standard care, and that "20 more will achieve functional independence."

The procedure, says Denver-area stroke specialist Dr. Donald F. Frei, "has the same transformative effect on treating stroke as penicillin did for infections."

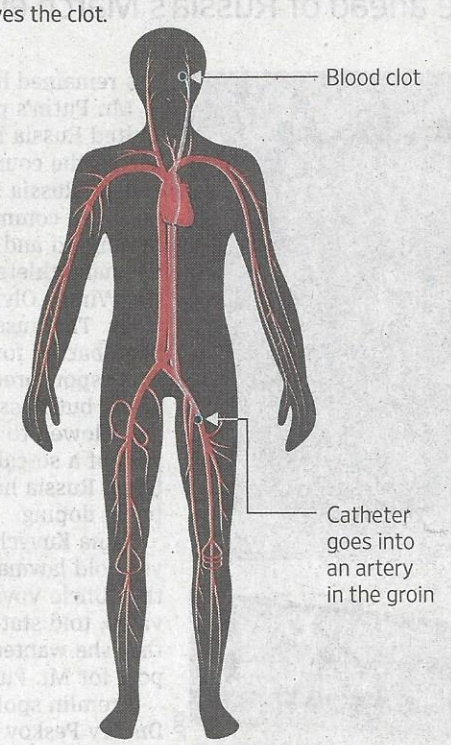
The contrasting experiences among patients such as the two in the Atlanta area show how far the U.S. medical establishment is from making the thrombectomy standard practice since it gained significant credibility from large clinical trials in 2014 and 2015.

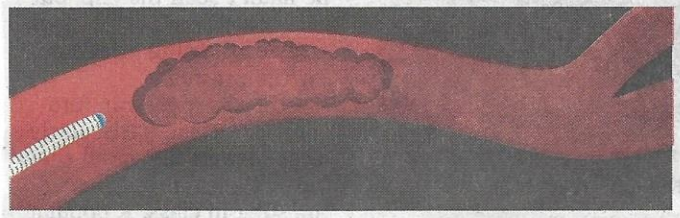
A severe-stroke victim must get a thrombectomy before damage sets in. For every minute with blood flow blocked, by many estimates, two million brain cells die.

Ambulance crews' protocols, though, often don't specify driving a severe-stroke patient directly to a thrombectomy-capable hospital, many stroke specialists say, so a patient often lands first in a hospital that can't do the procedure.

Restoring Blood Flow

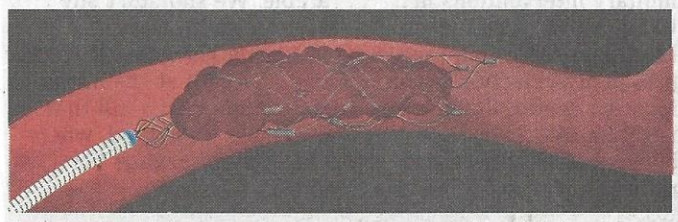
In a thrombectomy, a doctor routes a catheter through a stroke patient's artery system into the brain, where a clot is blocking blood flow. A small mechanical device called a stent-retriever grabs and removes the clot.



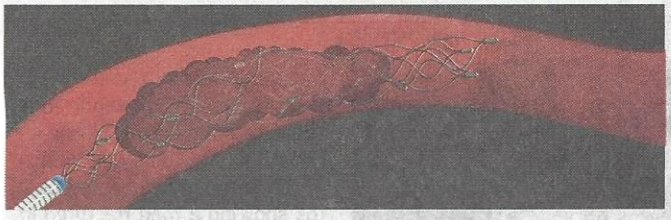


Catheter is maneuvered up into the blockage to the brain.

Stent-retriever is slid up through the catheter.



Catheter is withdrawn and stent-retriever traps blood clot.



Blood clot is pulled away, and blood supply to brain is restored.

Sources: Journal of the American Medical Association; Medtronic; Stryker Neurovascular; Banner Health

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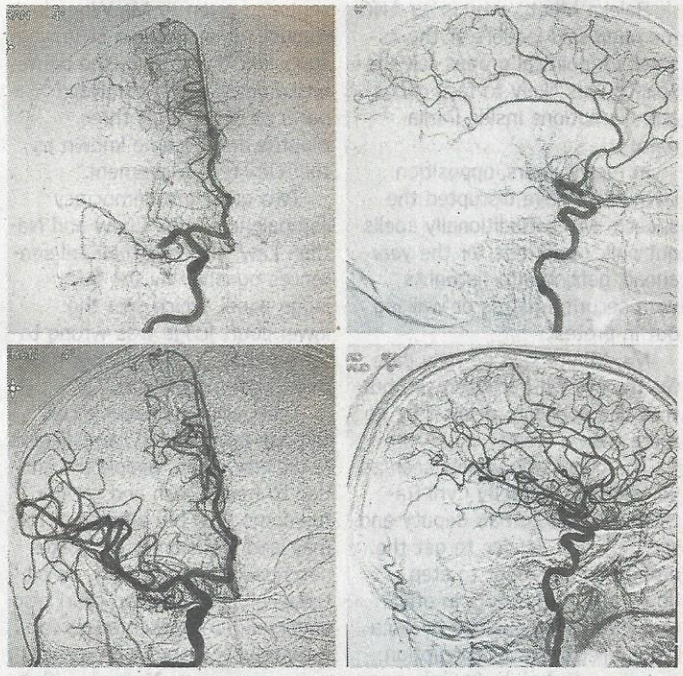

RAUL G. NOGUEIRA

The impact of clots before a thrombectomy, top photos, and afterward, bottom, showing improved blood flow.

Delayed treatment

In those hospitals, some medical research shows, there are often delays in getting patients who need a thrombectomy to the right hospital. Many patients with severe strokes aren't helped by conventional treatment with drugs, many stroke specialists say.

And a thrombectomy isn't an option at all in many regions. Many hospitals don't offer them, because it is hard to build thrombectomy teams of specialist doctors and assistants who can be on call 24 hours a day for the quick response such patients need. The procedure is new enough that there aren't enough specialists to hire, and doctors often must spend years learning it on the job.

The U.S. system that creates low thrombectomy rates is "almost at the point of being unethical," says stroke neurologist S. Claiborne Johnston, dean of the University of Texas Dell Medical School.

Stroke experts estimate that, as a general rule, thrombectomies should be going to 20% or more of patients with clot-caused strokes. This subset of patients have "large-vessel occlusion," large clots in large vessels that often trigger the worst disabilities or death. Thrombectomies don't apply to a brain hemorrhage, another major type of stroke.

Washington, D.C., metro-area hospitals—including those in Virginia and Maryland suburbs—did thrombectomies in 2% of Medicare clot-caused-stroke patients in the 12 months ended June 30, 2017, the lowest rate among the 50 largest U.S. metro areas. Denver was the area with the highest rate, 9.3%. The Wall Street Journal determined those rates by merging population data with Medicare stroke-and-thrombectomy data compiled by Definitive Healthcare LLC, a medical-data analysis company. Among all U.S. hospitals, the rate was 2.8%.

Some hospitals do better. Atlanta's Grady gave thrombectomies to 28% of its clot-based Medicare stroke patients in the year ended June 30. The University of Toledo gave them to 26% and Swedish Medical Center in Englewood, Colo., to 24% in the same period.

Thrombectomies, which have been used in some hospitals for a decade, gained currency after the positive 2014 and 2015 clinical trials. In the procedure, a doctor typically slides a catheter through an artery to the brain and grabs a clot, often with a relatively simple device called a stent-retriever.

A hospital must spend millions of dollars to gear up with special equipment and staff. But thrombectomies are well-reimbursed by Medicare and insurers, and ultimately are more profitable than a lower level of stroke treatment, says Tudor G. Jovin, chief of the University of Pittsburgh's renowned Stroke Institute.

Providence Regional Medical Center in Everett, Wash., treats about 750 clot-based stroke patients annually but doesn't do thrombectomies. Officials there say they are trying to build up a 24-hour-a-day thrombectomy capability. Until they do, they say, the regional ambulance service transports thrombectomy candidates an hour south to Seattle. The hospital's medical director for stroke, Dr. Tarvinder Singh, says Providence has the equipment to do thrombectomy and that he hopes to hire two specialists soon.

There is debate over which stroke victims should go immediately to thrombectomy. Some hospitals that aren't capable of doing thrombectomies say they can first give an anticlotting drug called tPA, and, if it isn't enough, quickly transfer patients to a comprehensive center for a thrombectomy.

Many stroke specialists say some hospitals that don't do thrombectomies resist a change in ambulance protocols because these allow the hospitals to admit more patients and hold on to them longer. Officials in non-thrombectomy hospitals say there isn't a financial motive for resisting protocol changes that may send patients elsewhere. They say it is optimal to see a stroke patient as quickly as possible, and that they are capable of transferring patients in a timely fashion.

Robert P. Holman, medical director of the District of Columbia Fire and Emergency Medical Services, agrees that the protocol in the capital often sends patients first to a non-thrombectomy hospital but says patients can be transferred to a thrombectomy center quickly and arrive there with just a 20-minute drive. He defends the current system by saying it is "very hard for our first responders to assess in the field" a stroke's severity.

And it is hard to tell afterward if a given patient would have benefited from a timely thrombectomy, because a stroke's impact is unpredictable. Dr. Nogueira in Atlanta's Grady uses the metaphor of fighting a forest fire: Sometimes, it stops the fire after a few trees burn. Other times, "irreversible damage has already taken place."

Even the conventional wisdom that all patients have only a short window of opportunity has been challenged. A study presented in Europe in 2017 showed some patients even 24 hours after a stroke can have a 73% lower risk of disability with a thrombectomy. The outcome largely depends on the patient's individual physiology, the researchers said.

Protocol questions

Fewer than 20 states have ambulance protocols directing severe-stroke patients to thrombectomy hospitals, according to the Society of NeuroInterventional Surgery.

In Washington, D.C., there is no requirement ambulances take severely-stricken patients to the three hospitals capable of thrombectomies. Instead, a stroke patient often gets taken initially to a hospital designated as a "primary stroke center." That designation is largely given to U.S. hospitals able to give the drug tPA, which usually won't dissolve the largest clots in large arteries.

Most of these hospitals don't offer thrombectomies, often leading to delay for patients who need them, says Jullette Saussy, former medical director of D.C. Fire and EMS.

Dr. Saussy quit in January 2016, she says, after unsuccessfully urging changes, including a revised stroke protocol in which paramedics would assess the severity of strokes in ambulances and speed more in for thrombectomies. Dr. Saussy says that in many cities, non-thrombectomy hospitals have resisted changing such protocols. "They have a fundamental belief, which I don't agree with, that paramedics can't diagnose severe stroke," she says. "We're not doing the right thing for patients."

Dr. Holman, who succeeded her, says his department's protocol hasn't changed since Dr. Saussy's departure but the department is trying to find ways for emergency personnel to screen patients and better decide whom to take directly to thrombectomy-ready hospitals.

A 984-patient study published in September 2017 in the journal Circulation concluded "interhospital transfer was associated with significant treatment delays and lower chance of good outcomes" from a thrombectomy.

Thrombectomy advocates say it has been demonstrated that paramedics can conduct simple measures to determine how severe a stroke is. Doctors from Barcelona wrote in the journal Stroke in December 2013 that they had created a scale that "is a simple tool that can accurately assess stroke severity" by emergency-medicine technicians. Authorities in some U.S. cities, including Pittsburgh, have adopted the scale.

Some U.S. regions have revamped their ambulance protocols to send stroke victims more quickly to thrombectomy hospitals, and many major hospitals have been gearing up procedures to get severe-

Ambulances often don't send patients to thrombectomy-capable hospitals.

stroke victims quickly into the treatment.

Among them is the University of Pittsburgh's UPMC Presbyterian hospital. When a possible stroke patient arrives at the emergency room, a neurology team member is notified immediately. If it is the right kind of severe stroke, the patient goes in for a thrombectomy immediately. A stroke patient in the emergency department gets evaluated in a median of 22 minutes, down from 59 minutes in 2015, the hospital says.

The UPMC's Dr. Jovin sometimes breaks into song and dance during the procedure. During a complex case last year involving five passes to remove clots, he sang "clot access number five," to the tune of "Love Potion No. 9."

A thrombectomy's benefits can be striking. Walter Noble and Harold "Butch" Wright, next-door neighbors in Mesa, Ariz., suffered severe strokes a month apart—Mr. Wright on Christmas Day 2014, Mr. Noble in January 2015.

They were taken to the closest hospital, Banner Baywood Medical Center. There, their fates diverged.

Doctors noted Mr. Noble's right-sided weakness, says Mohamed Teleb, the doctor who later treated him. They did a CT scan and gave him the drug tPA. Mr. Noble, then 75, started fluctuating between being able and unable to talk. They transferred him quickly to Banner Desert Medical Center for a thrombectomy, Dr. Teleb says.

The next morning Mr. Noble was alert. He says he now lives a normal life.

Mr. Wright had a stroke after 10 a.m., says his wife, MaryAnn Wright. He, too, got the drug, and his symptoms fluctuated, Dr. Teleb says. A neurologist was consulted at 3:57 p.m. Mr. Wright wasn't transferred to Banner Desert until around 7 p.m., says Dr. Teleb, who did both thrombectomies.

Dr. Teleb started Mr. Wright's thrombectomy at about 8:10 p.m. and found large amounts of tissue destroyed. Mr. Wright, five years younger than Mr. Noble, was sent to a hospice and died two days later, says Ms. Wright.

Dr. Teleb says the cases were "mirror images." The difference between the neighbors, he says, was that Mr. Noble was transferred "in a timely manner, while the other patient was transferred at least three or four hours later."

A spokeswoman for Banner Health, which includes both hospitals, says that at that time "medical literature did not clearly demonstrate that a thrombectomy was of benefit to patients suffering from an acute ischemic stroke" and that "once new literature and guidelines emerged, Banner took a lead in the early identification of patients who were candidates for this treatment."

Dr. Teleb says he and others are working toward a Phoenix-area ambulance protocol to send severe stroke patients more directly to thrombectomy-ready hospitals. He estimates it will take three to six months before that happens.