

Brain Bypass: Advanced Specialty Available at Novant Health Brings Hope to Patients.



Novant Health neurosurgeon is one of a few in the world to perform the surgery.

Everyone has heard of heart bypass surgery. But far fewer people are familiar with the unusual specialty of brain bypass surgery, which provides a new blood vessel into an area of the brain starved for blood.

Ziad A. Hage, MD, FAANS, FACS, founded and leads the Moyamoya and Cerebral Bypass Program at Novant Health. As the only neurosurgeon in Charlotte performing brain bypass surgery, he conducts about 30 of

these intricate operations a year on both pediatric and adult patient populations. Surgery can last up to 12 hours.

Here, the board-certified and fellowship-trained cerebrovascular, endovascular and skull base neurosurgeon describes how brain bypass surgery can benefit patients with moyamoya disease and other brain conditions.



“At Novant Health, we are one of the few centers in the world performing these complex surgeries.”

– Ziad Hage, MD, FAANS, FACS

What is moyamoya disease?

Hage: It's a rare condition, first described in Japan, that progressively causes narrowing and shutdown of the blood vessels of the brain. The vessel wall gets thicker because of buildup of certain types of proteins. There's much less blood flow to perfuse the brain and that can cause strokes.

It can take months or even years for blood vessels to shut down, which sometimes leaves enough time for the brain to try to create new channels to compensate. But the new blood vessels are very small and not as efficient as the normal vasculature. These tiny blood vessels almost look like a puff of smoke. “Moyamoya” means “puff of smoke” in Japanese.

What are the symptoms and who does this disease strike?

Hage: Stroke symptoms, bleeding in the brain and decrease in neuro-cognitive abilities are hallmarks of the disease. Most patients have had strokes or bleeding visible on an MRI. Others have had a transient ischemic attack. Unfortunately, the exact cause of moyamoya isn't known and there's no medical cure. The only way to treat it in properly selected patients is bypass surgery.

Apart from moyamoya disease, how can brain bypass surgery benefit patients with other conditions such as brain aneurysms or brain tumors?

Hage: Diseases that involve having a blockage in a blood vessel of the brain may benefit from revascularization.

Some patients have brain aneurysms, or brain tumors that would require

us to sacrifice a blood vessel on purpose in order to treat the disease. Obviously, taking a blood vessel will cause a major stroke. Before you take that vessel, you can create a bypass in the area you're going to sacrifice to preserve the blood flow. At Novant Health, we are one of the few centers in the world performing these complex surgeries using Flow Assisted Surgical Techniques (FAST). Using a device called the Charbel flow probe, we can intraoperatively measure the blood flow needed to be replaced and predict the success of the bypass, among other things.

Moreover, it's important to select the right patients who may benefit. We use the NOVA (noninvasive optimal vessel analysis) software that, in conjunction with an MRI, allows us to measure blood flow in the brain noninvasively and determine the best candidates for bypass surgery.

Can some people return to more normal life after this surgery?

Hage: Yes, absolutely. It's important to know that in patients who present with a stroke and have a residual deficit such as paralysis or inability to speak, unfortunately, I can't reverse what's happened. The main goal of the surgery is to reduce the chances of further strokes or brain bleeds.

By creating new, healthier pathways for the blood to get into the brain, you offload those more fragile pathways that the brain tried to develop that are not perfect. People will often have an improvement in neuro-cognitive abilities as well after surgery, in areas such as thinking, mathematics and reading.

How did you get interested in cerebrovascular neurosurgery?

Hage: My father is a medical oncologist and my love for medicine was deeply influenced by him. I was born in Lebanon in the middle of the war. Because of the war, we moved to Paris during my childhood. I did my medical school at the American University of Beirut and decided to train in neurosurgery in the United States. I was fortunate to train with one of the best bypass surgeons in the world at the University of Illinois in Chicago.

What's satisfying to you about this work?

Hage: Moyamoya is a rare disease and very difficult to treat. Other cerebrovascular diseases or tumors requiring bypass surgery are equally challenging. Brain bypass surgery is a highly complex procedure. Only a few centers in the world have the capability of doing it and only a few surgeons in the world have adequate training.

I'm honored and privileged to be able to help our patients. I'm proud Novant Health has the capability of treating these complex diseases.

To work with Ziad Hage, MD, FAANS, FACS or refer a patient, please call Novant Health Brain & Spine Surgery – Cotswold at 704-316-3070

