

NEUROSURGERY WITHOUT THE KNIFE

Imagine brain surgery with no shaved head and no incision. As far-fetched as this may sound, it's now possible, thanks to the emerging field of endovascular neurosurgery. Rather than working through a cranial incision, surgeons take an alternate route to the brain through the body's own natural highway system: the blood stream.

Endovascular procedures begin not at the head, but rather the groin, where microcatheters armed with tiny instruments are fed into the femoral artery through a small puncture. Using fluoroscopic X-ray imaging as a guide, the surgeon navigates these minute, highly sophisticated tools up through the chest and into the brain, where they are used to tackle problems such as aneurysms and tumors. By entering through the arteries, doctors can reach the deepest parts of the brain without causing trauma to healthy brain tissue.

One of the most promising uses of endovascular technology is aneurysm repair. There are no established guidelines for preventive screenings for aneurysms. Some are detected incidentally when a patient is undergoing a brain scan for another condition and other aneurysms are found after they rupture, causing a deadly condition called subarachnoid hemorrhage. Patients with brain aneurysms may be candidates for "endovascular coil embolization", a technique that uses a series of tiny platinum coils—some as tiny as 1.5 mm—to fill the aneurysm and obliterate them from normal blood vessels thereby eliminating the danger of rupture in the brain. Once deployed, the coils cause changes in blood flow

to "wall off" the aneurysm from the normal blood vessel.

"An aneurysm is like a little blister or outpouching of the wall of the blood vessel, which is sensitive to turbulent blood flow," explains endovascular neurosurgeon Sid Chandela, MD, who is trained in both endovascular and open neurosurgical procedures and recently joined the medical staff at Virginia Hospital Center as Director of Neurovascular Surgery. "Treatment involves preventing blood from flowing into the thin-walled aneurysm by using coils or clips during open surgery. A ruptured aneurysm is an emergency and patients often have 'the worst headache of their lives' and neurological changes. Once ruptured, a brain aneurysm behaves like an active volcano with a high risk of re-rupture requiring immediate neurosurgical treatment."

There are many factors involved in deciding which treatment approach is best. Open surgery involves incision and dissection of the brain to find the aneurysm and clip it to remove it from circulation. Clipping is durable and long-lasting, ensuring a permanent fix. Coiling is a minimally invasive safe alternative, but it does require close follow-up with routine brain scans to ensure the aneurysm remains closed off.

For some patients whose conditions might otherwise be diagnosed as inoperable, endovascular neurosurgery offers new hope. Because the technique is minimally-invasive, it also presents an alternative for patients whose age or mitigating health risks



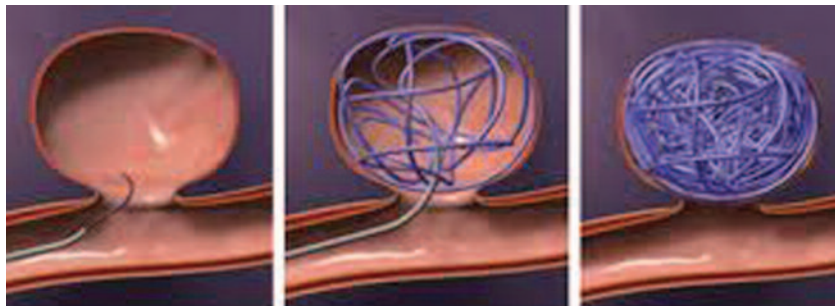
Sid Chandela, MD

leave them unable to tolerate open brain surgery.

"With the endovascular approach, there is no shaving, no craniotomy, and no incision, so recovery is much quicker," explains Dr. Chandela, who is one of only 90 practicing endovascular neurosurgeons nationwide and the only one in northern Virginia. "If the surgery is elective—meaning the aneurysm has not ruptured—the procedure requires only a one-night hospital stay. Patients are back at home and able to resume normal activities within a day or two."

In addition to aneurysm repair, endovascular neurosurgery may be used to fix arteriovenous malformations (AVMs)—abnormal connections between cerebral arteries and veins that pose a risk of hemorrhage. For patients with carotid stenosis (a narrowing of the major artery that feeds the brain) it may be used to implant stents and reduce the risk of stroke.

The technique can also help eradicate certain brain tumors that rely on a rich blood supply. "This is often done as a preliminary step prior to open surgery," explains Dr. Chandela. "We go in with the catheter first and shrink the tumor from the inside by filling it with embolic glue. That makes open surgery safer for the patient because there is less blood loss." ■



(Left to right) Microcatheter being positioned at the entry zone or "neck" of aneurysm. The first coil being deployed inside aneurysm through the microcatheter. All coils are deployed inside aneurysm to completely fill the aneurysm and block blood from entering, while preserving normal blood flow to the main blood vessel.

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