

## Newest version of laser scalpel aids brain surgery

Latest device used for the first time in the Midwest on tumor patient

By Robert Mitchum

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For doctors Bernard Bendok and Andrew Fishman, removing a tumor from the base of Stephen Abbott's brain was a surgical challenge of narrow margins.

Nestled between the cerebellum—the brain region responsible for balance and movement—and a large vein, the tumor would normally require removal with laborious and precise cuts with a scalpel and care to avoid damage to surrounding areas.

But Bendok and Fishman used the latest version of an old tool: a laser scalpel, called the BeamPath NEURO, made far more flexible than previous models by advances in fiber optic technology. With the added speed and precision offered by the laser, the surgeons were able to remove the tumor in October in less than an hour, roughly half the time it would have taken with a regular blade.

As a result, Abbott, the first patient in the Midwest to be operated on using the device, was able to return to his Prospect Heights home a mere four days after the procedure.

"It makes the surgery more expedient and more efficient," said Fishman, a neurologist and skull base surgeon at Northwestern Memorial Hospital. "It all adds up to a quicker bouncing back of the patient."

While the concept of using lasers as surgical blades has been around since the late 1960s, limitations of the devices have made them too cumbersome to be used for all but a few procedures, including the popular Lasik eye surgery.

But a military-funded project resulting in a breakthrough by a graduate student at the Massachusetts Institute of Technology led to a way of delivering a high-powered carbon dioxide laser beam through a fiber flexible enough to reach difficult areas with the control necessary for delicate surgeries. Rather than manipulating a large, awkward device to aim the beam, surgeons could direct it with a hand-held device that resembles a pencil with a long, thin tip.

"It's essentially the difference between using a big, broad brush versus a very refined brush to really paint something," said Bendok, a vascular and skull base neurosurgeon with Northwestern Memorial. "It's the difference between painting a wall and painting a painting."

Yoel Fink, an associate professor of materials science at MIT, invented the concept that led to the fiber in the mid-90s for a Department of Defense project. The military was seeking a mirror that would be highly efficient in reflecting light, and Fink designed a layered structure that could accomplish the task.

But applying that technology as a surgical tool didn't occur to Fink until several years later, when he realized his structure could make a new fiber optic cable strong enough to deliver laser beams too powerful for normal cables.

Fink's device was first marketed two years ago to head and neck surgeons who used it to remove tumors and other growths from the tongue, throat, voice box and other structures. Dr. Guy Petruzzelli, chief of head and neck surgery, at Rush University Medical Center, was the first of his field in Illinois to use the laser, and said it allows him to operate on more patients with less invasive methods.

"It really increases ability to use a laser to access some of the tumors," Petruzzelli said. "One can take out tumors you potentially couldn't remove in the past."

In brain surgery, for which the laser was approved in September, Bendok and Fishman emphasize that while the

tool will likely not make previously inoperable tumors removable, it dramatically improves the efficiency and safety of surgeries. And as the technology continues to improve, laser scalpels could help doctors perform more surgeries with smaller, less invasive incisions, doctors said.

“I think there will always be a role for the scalpel, a little bit like pen and paper with all new technology available,” Bendok said. “But I think the laser is going to replace the scalpel in many situations.”

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