

# Researchers quantify benefits of minimally invasive removal of hard-to-reach tumors

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A minimally invasive endoscopic procedure holds promise for safely removing large brain tumors from an area at the bottom of the skull, near the sinus cavities, clinical researchers at the Brain Tumor Center at the University of Cincinnati Neuroscience Institute (UCNI) at University Hospital have found.

The findings, to be published in the April 2010 issue of the [Journal of Neurosurgery](#) and previously published online in October 2009, have important implications for patients with large pituitary tumors (pituitary macroadenomas).

"This is the first time that a quantitative advantage has been shown for the use of endoscopy in cranial surgery," says Philip Theodosopoulos, MD, principal investigator of the study, director of skull base surgery at UC and a neurosurgeon with the Mayfield Clinic.

"This signals the dawn of a new era in minimally invasive cranial surgery. We have moved from the realm of assessing whether it is feasible to studying its clinical effectiveness. In this way, it is slowly starting to change from a novelty to standard treatment, setting the bar for the quality of surgical outcomes higher than ever before."

Although tumors of the pituitary gland, located near the base of the skull, are benign, pituitary macroadenomas can wreak havoc, causing acromegaly (an overproduction of growth hormone), Cushing disease (an overproduction of the hormone cortisol) and hyperthyroidism, as well as

visual problems, headaches and dizziness.

When removing pituitary macroadenomas (tumors that are larger than 10 millimeters), surgeons have employed three distinct routes to the tumor:

- Through the skull, in a procedure called a craniotomy.
- Through an incision under the upper lip and then through the septum, which must be split apart.
- Through the nostrils -- a transnasal approach -- without an incision.

The endoscopic transsphenoidal approach, Theodosopoulos says, follows natural anatomical corridors and causes less disruption of nasal tissues. This approach, as the new study reveals, also holds benefits related to complete tumor removal, which is important for the patient's quality of life.

Removing an entire pituitary macroadenoma can be difficult because the tumor's growth pattern can cause it to extend through the sinus corridor, which is out of the surgeon's view.

Surgeons can ensure that the entire tumor has been removed if their hospital operating room is equipped with a technology known as intraoperative MRI, or ioMRI. The surgery-prolonging technology enables surgeons to take MRI scans while the patient is still under anesthesia and on the operating table. The UC Neuroscience Institute at University Hospital has had ioMRI since 1999, but the expensive technology is not available at most hospitals.

An endoscopic approach, by contrast, allows the surgeon to check for

remaining tumor with "intrasellar endoscopy." Using a tiny, sophisticated camera on an angled endoscope, the surgeon can peer around bends and into crevasses to identify any remaining tumor. "The endoscopic approach holds the potential for less invasive treatment for all patients and more complete tumor resections for individuals treated in hospitals without access to intraoperative MRI," Theodosopoulos says.

During the retrospective study at University Hospital, the team analyzed surgical outcomes of 27 consecutive patients between 2005 and 2007 who had undergone endoscopic removal of pituitary macroadenomas. The search for unexpected residual tumor was conducted two ways in all patients: first with the tiny endoscopic camera (intrasellar endoscopy) and then with intraoperative MRI.

Following the initial endoscopic tumor removal, intrasellar endoscopy revealed that 23 of the 27 patients (85 percent) had no unexpected residual tumor. Surgeons were able to safely perform additional surgery on three of the four patients who had unacceptable residual tumor.

Following the endoscopic procedures, all patients were checked with intraoperative MRI, which revealed that tumor removal was successful in 26 patients (96 percent).

The study results show that maximum tumor removal can be successfully achieved with endoscopy and without intraoperative MRI, Theodosopoulos says. He adds, however, that the findings could be strengthened by a larger study.

Provided by University of Cincinnati Academic Health Center

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