EEA a safe, effective approach for removing all large pituitary adenomas

by **Paul Gardner, MD**

A recent review of the endoscopic endonasal approach (EEA) for resection of pituitary adenomas at the University of Pittsburgh Medical Center between 2002 and 2011 showed that this approach—pioneered at UPMC—is a safe and effective method for removing even giant and invasive tumors.

The average follow up was 3.1 years (range three months to 9.5 years). Ninety-one (17.5%) of the patients were operated on for recurrent adenomas. An expanded approach to reach the supra-, para- and infra-sellar spaces was employed in 290 patients (55.9%). Reconstruction with a vascularized nasal septal flap was used in 238 cases (65.6%).

The rate of complete removal was 65.3% in the 359 patients with non-functioning adenomas. The remission rates with EEA alone were 82.5% in 57 patients with Cushing's disease (ACTH-secreting tumors), 65.3% in 49 patients with acromegaly (GH-secreting adenomas) and 54.7% in 53 patients with prolactinomas.

The EEA was found to offer an advantage especially in challenging adenomas such as recurrent tumors, those with suprasellar extension *(figure 1)* or cavernous sinus extension *(figure 2)*. In fact, many tumors with cavernous sinus invasion, previously thought to be unresectable, were able to be completely removed *(figure 3)*.

Outcomes were favorable and complication rates low when compared with traditional approaches. Of the 237 patients presenting with visual loss, 190 (80.2%) improved or normalized, 41 (17.3%) remained unchanged, and only six (2.5%) experienced transient visual deterioration due to postoperative apoplexy. None of these patients suffered permanent visual worsening. In addition, no patient without preexisting visual loss suffered new visual decline. These results are an improvement over microscopic transsphenoidal approaches. The collaboration with otolaryngology in the two-surgeon, four-hand endoscopic technique along with the improved visualization provided by the endoscope (wider, high definition field of view) allows for better identification of the optic apparatus, which may be part of the reason for these results.

This also likely contributes to other improvements noted with the EEA including better preservation of the pituitary gland and stalk with lower rates of postoperative pituitary dysfunction, including diabetes insipidus. Patients also had fewer nasal complications such as sinusitis and septal perforation.

All complications were evaluated including the postoperative CSF leak rate that decreased from 5% to 2.9% after the introduction of reconstruction with the naso-septal flap. Despite frequent carotid and cavernous sinus dissection, only two patients (0.3%) had an internal carotid artery injury and neither suffered a stroke as a result.

In conclusion, the EEA is a safe and effective way to surgically approach pituitary adenomas, particularly recurrent tumors, those with supra-sellar extension or cavernous sinus invasion. The remission and complication rates are comparable or favorable compared with those reported in previous series of microscopic and endoscopic approaches. •

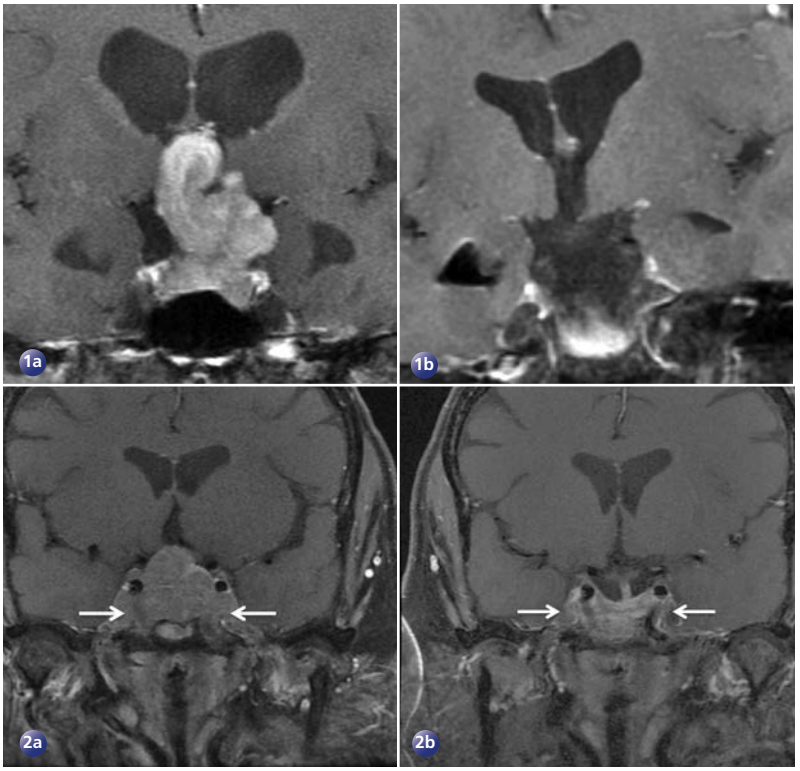
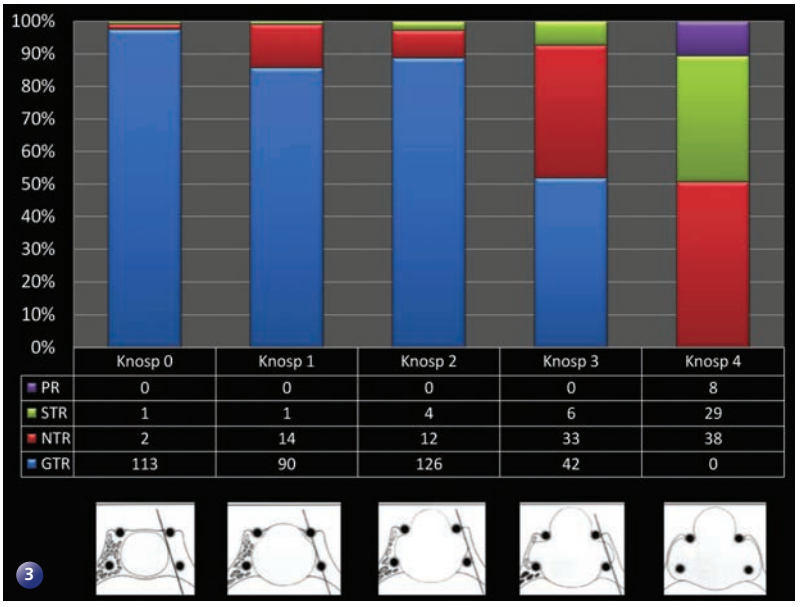


Figure 1a: Preoperative, coronal T1-weighted, postcontrast MRI showing a large, multilobular adenoma with significant suprasellar extension into the third ventricle. Figure 1b: Postoperative, coronal T1-weighted, postcontrast MRI following an endosopic endonasal, complete resection. Figure 2a: Preoperative, coronal T1-weighted, postcontrast MRI showing a large pituitary adenoma that invades both cavernous sinuses (arrows). Figure 2b: Postoperative, coronal T1-weighted, postcontrast MRI following removal using an endoscopic endonasal approach (EEA). The arrows show that the tumor in the cavernous sinuses has been removed.



	Knosp 0	Knosp 1	Knosp 2	Knosp 3	Knosp 4
PR	0	0	0	0	8
STR	1	1	4	6	29
NTR	2	14	12	33	38
GTR	113	90	126	42	0

Figure 3: Table showing rates of gross total resection (GTR) based on Knosp grading (Grade 0 is no cavernous sinus invasion, Grade 4 is complete invasion with encircling of the cavernous carotid). Based on these results, many tumors with cavernous sinus invasion, especially those not involving the lateral cavernous sinus where the oculomotor nerves resides (Grade 4), can be completely removed.