Endoscopic Endonasal Surgery for Nonadenomatous Sellar/Parasellar Lesions

Garni Barkhoudarian[1], Gabriel Zada[2], Edward R. Laws[3]

Key words
- Craniopharyngioma
- Endoscopy
- Pituitary
- Rathke cleft cyst
- Transphenoidal surgery

Abbreviations and Acronyms
CSF: Cerebrospinal fluid
CT: Computerized tomography
DI: Diabetes insipidus
MRI: Magnetic resonance imaging
NGGCT: Nongerminomatous germ cell tumor
SCC: Squamous cell carcinoma

From the [1]Department of Neuroscience and Neurosurgery, Brain Tumor Center and Pituitary Disorders Program, John Wayne Cancer Institute, Santa Monica; [2]Department of Neurosurgery and University of Southern California Pituitary Center, Neuro-Oncology and Endoscopic Pituitary/Skull Base Program, Keck School of Medicine of University of Southern California, Los Angeles, California; and [3]Department of Neurosurgery, Harvard University, Brigham and Women's Hospital, Boston, Massachusetts, USA

To whom correspondence should be addressed: Edward R. Laws, M.D. [E-mail: elaws@partners.org]

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INTRODUCTION: **This article demonstrates the experience with endoscopic transphenoidal anterior skull base surgery for lesions other than pituitary adenomas. The spectrum of lesions, results, and complications are presented.**

PATIENTS AND METHODS: **This series includes patients with 102 lesions other than pituitary adenomas operated upon using the endoscopic approach. The results and complications were reviewed retrospectively.**

RESULTS: **The most common lesions treated were Rathke Cleft Cysts (n = 39) and craniopharyngiomas (n = 18) in a total of 82 tumors. There were 8 patients with inflammatory lesions, and the remainder had a variety of unusual pathologies. Complications other than diabetes insipidus (n = 12) were uncommon, with 6 postoperative cerebrospinal fluid leaks.**

CONCLUSIONS: **The endoscopic anterior skull base approach is highly effective in treating a large variety of lesions other than pituitary adenomas. The adoption of the nasoseptal flap for closure has markedly reduced the incidence of spinal fluid leaks, and is used routinely for lesions that violate the intracranial compartment.**

INTRODUCTION

The concept of the minimally invasive transnasal approach to the anterior skull base was initially conceived for pituitary adenomas, the most common intrasellar pathology. Because the operating endoscope became a critical and essential feature of this approach, the ability to move beyond strictly sellar pathology became obvious. The extended transsphenoidal approach, initially pioneered with the operating microscope, became increasingly versatile as the operating endoscope enhanced the capabilities of this exciting technical advance. Because this approach evolved, it was rapidly applied to a wider spectrum of pathology. Concurrently, our colleagues in head and neck surgery became less insistent on the en-bloc removal of some midface lesions, as follow-up data did not always support this concept.

Pure endoscopic and endoscopic-assisted transsphenoidal surgery rapidly emerged in the late 1990s and early 2000s, as the obvious benefits of this technology, including improved panoramic visualization, illumination, angled lenses, and increased mobility, became obvious to surgeons. Because lesions of the anterior skull base, the suprasellar compartment, the clivus, and all of the anterior sinuses became accessible using this minimally invasive transnasal endoscopic method, its popularity has spread quite widely during the past decade. The collaboration between neurosurgeons and otorhinolaryngologists has been essential to the development and spread of this approach, and to its application to a variety of pathologic entities.

Also essential to this novel approach is the surgeon's adherence to the basic principles of skull-base surgery. Paramount among these is the incorporation of the basic aspects of microsurgery and microtechnique combined with minimizing brain retraction. These appoaches require surgery to be performed with two hands, thus dividing the operation between the microsurgeon, and the surgeon responsible for maintaining visualization and illumination with the endoscope. This team approach contributes greatly to the elegance of the operative procedure. The aim of this study was to review our institutional experience with nonadenomatous lesions of the sellar and parasellar region, particularly with respect to the endonasal endoscopic approach as our preferred operative technique for treating these lesions.

ENDOSCOPIC EXPERIENCE

Our experience, at present, at the Brigham and Women's Hospital (April 2008—October 2011) includes 438 operations with the endonasal transsphenoidal approach. Of these, the endoscope was used on its own (97.5%) or in concert with the operative microscope in 408 patients. Typically, the microscopic approach alone was reserved for emergency operations, those without surgical assistants experienced with endoscopy, and for the education of residents unfamiliar with the microscopic approach.

Of these 408 operations, 102 (25%) were for parasellar pathology other than pituitary

Table 1. Complications Encountered

Complications	Number of Patients	%
DI (permanent)	12	11.76
DI (transient)	3	2.94
SIADH	9	8.82
Epistaxis	6	5.88
CSF leak	6	5.88
Visual loss	2	1.96
Meningitis	2	1.96
Hypopituitarism	2	1.96
Vascular injury	1	0.98
Pneumonia	1	0.98
Tumor bed hemorrhage	1	0.98

DI, diabetes insipidus; SIADH, syndrome of inappropriate antidiuretic hormone; CSF, cerebrospinal fluid.

Table 2. Pathology Encountered

	Number of Patients	
Tumors/Cysts		
Rathke cleft cyst	39	One RCC associated with GH secreting adenoma
Craniopharyngioma	18	
Arachnoid cyst	8	
Pituitary cyst	2	
Colloid cyst	1	
Chordoma	3	
Chondrosarcoma	1	
Granular cell tumor	1	
Metastases	4	Breast CA, prostate CA, renal cell CA, SCC
Lymphoma	1	
Meningioma	1	
Pituitary carcinoma	1	
Oncocytoma	2	
Total tumors/cysts	82	
Inflammatory Disease		
Lymphocytic hypophysitis	4	
Wegener's granulomatosis	1	
Giant repairative granuloma	1	
Granulomatous lesion	1	
Pituitary inflammation	1	
Total Inflammatory Disease	8	
Bone Lesions		
Fibrous dysplasia	1	
Basilar invagination	1	
Lipomatous bone cyst	1	
Total Bone Lesions	3	
Miscellaneous		
Nondiagnostic	3	Patients presented with headaches and enlarged pituitary glands
Normal gland	2	Work-up for Cushing's disease
Spontaneous CSF Leak	2	
Pituitary hyperplasia	1	
Aneurysm	1	
Total Miscellaneous	1	
Total Nonadenomatous lesions	102	

RCC, Rathke cleft cyst; GH, growth hormone; CA, carcinoma; SCC, squamous cell carcinoma; CSF, cerebrospinal fluid.

adenoma (Table 1). There was a wide range of disorders—the most common being Rathke cleft cysts, craniopharyngiomas, and arachnoid cysts. In our experience, the endonasal transsphenoidal approach was the most versatile for these lesions. Use of the endoscope, including angled lenses, offered better visualization and more definitive treatment of these lesions.

The most common presenting symptom of these lesions was headaches, followed by visual loss and hypopituitarism. A small number of tumors were identified incidentally, particularly with regard to cystic lesions such as Rathke cleft and colloid cysts. Of those patients presenting with headaches, most were improved or remained the same. Only 1 patient, who had undergone pituitary biopsy for Wegener's granulomatosis, had worsening of her headaches (Table 1).

In patients who had presented with visual field or acuity deficits, most had improved or unchanged postoperative visual examinations. Three patients, all of whom harbored craniopharyngiomas, had worse postoperative visual examinations, 2 of which were probably related to vascular insufficiency. Some postoperative improvement occurred in all 3, none of whom was blind.

The overall complication rate, including anterior and posterior pituitary dysfunction, was 38.2%. Craniopharyngioma had the highest aggregate (including major, minor, and hormonal) complication rate of 61%, followed by Rathke cleft cysts at 38.5% and arachnoid cysts at 25% (Table 2). The most common nonhormonal complications were postoperative epistaxis (6%) and cerebrospinal fluid (CSF) leak (5%).

Although approached from similar surgical avenues (some are transsphenoidal-