Intraoperative Conversion From Endoscopic to Microscopic Approach for the Management of Sellar Pathology: Incidence and Rationale in a Contemporary Series

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Key Words:
- Endoscopic
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- Pituitary
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- Sella turcica
- Surgical approach
- Transsphenoidal

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BACKGROUND: **The endoscopic transsphenoidal approach has become widely used for pituitary and extended skull base operations. Intraoperative conversion to a microscopic approach may be an important option in selected cases. We aim to characterize the operative situations in which such conversion occurred and facilitated the procedure.**

METHODS: **From April 2008 through August 2009, 148 planned endoscopic transsphenoidal approaches were performed. All cases were retrospectively reviewed to identify those patients converted to a microscopic approach. Clinical and operative characteristics, reasons for conversion, and patient outcomes were reviewed.**

RESULTS: **Of the 148 endoscopic cases, conversion was undertaken in 27 (18%). Ten patients (37%) had undergone previous transsphenoidal surgery. Reasons for conversion in nonreoperation cases were atypical nasal anatomy (6 patients), acromegaly with distorted anatomy (5 patients), desire for binocular vision (3 patients), complex sphenoid sinus anatomy and difficulty visualizing sella/midline (2 patients), and obstructive mucosal bleeding (1 patient). Of the 10 reoperation procedures, conversions occurred in 3 patients with Cushing's disease and 2 with acromegaly. The primary reasons for conversion in reoperations were scarring with loss of anatomic landmarks (4 patients), mucosal bleeding (2 patients), acromegaly with distorted anatomy (2 patients), technical problem with visualization (1 patient), and desire for binocular surgery (1 patient).**

CONCLUSIONS: **Although endoscopic transsphenoidal surgery provides superior visualization in most patients, conversion to a microscopic or endoscopic-assisted approach may provide essential visualization in selected patients. This may be especially true in patients undergoing reoperation and patients with acromegaly or Cushing's disease. Trainees learning the endoscopic transsphenoidal approach should become familiar with the benefits and limitations of the various transsphenoidal approaches.**

INTRODUCTION

Since the introduction of transsphenoidal surgery more than a century ago, the approach has undergone tremendous evolution, facilitated primarily by advances in technological implementation such as the operating microscope and the endoscope (12, 15). Many modifications of the transsphenoidal approach are currently in use today, including the sublabial and endonasal microscopic approach, the endoscopic-assisted microscopic approach, and the endonasal endoscopic approach. In the past 10 years, the endoscopic approach has gained favor as a primary approach for many sellar and parasellar lesions, primarily due to the panoramic, up-close visualization offered by the endoscope (1, 3, 4, 10, 17). The microscopic approach to the sellar region, however, confers the benefit of binocular, three-dimensional optics that are only recently becoming available with the endoscope (18). Many previous reports have analyzed the merits and limitations of these various modifications of the transsphenoidal approach (6, 8, 9, 13, 14). In reality, however, surgical outcomes with regards to tumor resection are more likely to depend more on the surgeon's technique and experience rather than on the particular approach used (19). Currently, at our institution, 92% of transsphenoidal operations are performed through a planned endoscopic endonasal approach. In selected cases, however, conversion to a microscopic technique with insertion of a nasal speculum may facilitate the surgical procedure. The aim of the current study was to characterize the clinical and operative scenarios in which conversion from an endoscopic to a microscopic transsphenoidal approach was performed.

MATERIALS AND METHODS

The neurosurgery database of the Brigham and Women's Pituitary program was reviewed to identify patients undergoing transsphenoidal surgery for sellar or parasellar pathology during a 16-month period, between April 1, 2008 and August 1, 2009. The operative records of 148 consecutive patients who underwent planned endoscopic transsphenoidal surgery were reviewed to identify cases in which an endoscopic procedure was converted to a microscopic one. The reasons for approach conversion and clinical characteris-

Table 1. Indications for Surgery in 27 Patients Requiring Conversion from an Endoscopic to a Microscopic Transsphenoidal Approach

	Indication for surgery	Patients	Percentage
No previous surgery	Nonfunctional macroadenoma	7	26
	GH-secreting tumor + acromegaly	5	19
	Other*	5	19
	Total	17	64
Previous surgery	ACTH-secreting tumor	3	11
	GH-secreting tumor + acromegaly	2	7
	Nonfunctional macroadenoma	2	7
	Other†	3	11
	Total	10	36
Total		27	100

GH, growth hormone; ACTH, adrenocorticotropic hormone.
*Other, prolactinoma, craniopharyngioma, clival chondrosarcoma, lymphoma, and metastatic carcinoma.
†Other, prolactinoma, Rathke cleft cyst, chiasmapexy for optic chiasm prolapsed.

tics of these patients were subsequently reviewed.

The surgical description of the endonasal endoscopic approach has been reported elsewhere (2). Intraoperative neuronavigation is routinely used. During the nasal and sphenoid stages of the procedure, we use a one-surgeon approach with an 18-cm, 0-degree endoscope. For the sellar stage of the operation, we convert to a 30-cm, 0-degree endoscope and use a two-surgeon, four-handed technique. Thirty-degree and 45-degree endoscopes are used as indicated. The operating microscope is readily available on stand-by in the operating room for all cases, and may be brought into use when necessary. In the case of a microscopic procedure, a Fukushima nasal speculum is typically used.

RESULTS

During a 16-month period, 148 planned endoscopic transsphenoidal cases were performed. Of these cases, 27 (18%) were converted to a microscopic approach. Patient ages ranged from 22 to 81 years. There were 16 men and 11 women. Ten patients (37%) had undergone previous transsphenoidal surgery. The indications for surgery were (Table 1): nonfunctional macroadenoma (10 patients), acromegaly (7 patients), adrenocorticotropic hormone-secreting tumor (3 patients), prolactinoma (2 patients), and other pathology (6 patients). In two patients, conversion to a microscopic procedure provided a significant temporary benefit in adequately identifying and exposing the sella, after which the approach was converted back to an endoscopic approach.

In nonreoperation cases, the reasons for conversion were (Table 2): atypical nasal anatomy (6 patients), acromegaly with distorted anatomy and polyps obscuring anatomic landmarks (5 patients), complex sphenoid sinus anatomy and difficulty visualizing the sella with certainty (3 patients), extended approach with desire for binocular vision (2 patients), and mucosal bleeding (1 patient). Of the six patients with obscure nasal anatomy, use of the endoscopic approach and identification of key anatomic landmarks was precluded for the following reasons (often multiple): limited working space, nasal polyposis, septal deviation, bony spurs, and tumor in sinus (1 patient with metastatic carcinoma). In three patients with complex sphenoid sinus bony anatomy and flat sellar floors, conversion to the microscopic technique was attempted to assist in the identification of the midline and sellar floor. In two patients undergoing extended approaches (1 for a suprasellar craniopharyngioma and another for a clival chordoma), the microscope was introduced to improve binocular vision during drilling of the skull base. In one patient, significant obstructive mucosal bleeding was encountered, and the nasal speculum was introduced to assist with hemostasis and visualization.

Of the 10 patients who had undergone previous transsphenoidal surgery and underwent conversion to a microscopic procedure, it occurred in 3 had Cushing's disease/Nelson's syndrome, and 2 had acromegaly. The main reasons for conversion in reoperations were (Table 2): loss of anatomic landmarks due to scarring (4 patients), mucosal bleeding

Table 2. Reasons for Conversion to Microscopic Approach in 27 Patients Undergoing Planned Endoscopic Transsphenoidal Surgery

	Reason for conversion	Patients	Percentage
No previous surgery	Atypical nasal anatomy + inability to identify landmarks	6	22
	Acromegaly/tissue hypertrophy	5	19
	Complex sphenoid sinus/difficulty identifying sellar floor	3	11
	Extended approach with desire for binocular vision	2	7
	Mucosal bleeding	1	4
	Total	17	63
Previous surgery	Scar tissue + inability to identify landmarks	4	15
	Acromegaly/tissue hypertrophy	2	7
	Mucosal bleeding	2	7
	Technical problem with visualization	1	4
	Extended approach with desire for binocular vision	1	4
	Total	10	37
Total		27	100