Time Course of Symptomatic Recovery After Endoscopic Transsphenoidal Surgery for Pituitary Adenoma Apoplexy in the Modern Era

Hasan A. Zaidi, David J. Cote, William T. Burke, Joseph P. Castlen, Wenya Linda Bi, Edward R. Laws Jr, Ian F. Dunn

BACKGROUND: **Pituitary tumor apoplexy can result from either hemorrhagic or infarctive expansion of pituitary adenomas, and the related mass effect can result in compression of critical neurovascular structures. The time course of recovery of visual field deficits, headaches, ophthalmoparesis, and pituitary dysfunction after endoscopic transsphenoidal surgery has not been well established.**

METHODS: **Medical records were retrospectively reviewed for all patients who underwent endoscopic transsphenoidal surgery for pituitary tumor apoplexy from April 2008 to November 2014.**

RESULTS: **Of 578 patients who underwent transsphenoidal surgery, pituitary tumor apoplexy was identified in 44 patients (7.6%). Two patients had prior surgery, leaving 42 patients for final analysis. These included infarction-related apoplexy in 7 (14.4%) patients, and hemorrhagic apoplexy in 35 (85.6%) patients. Hemorrhagic adenomas had a larger axial tumor diameter than patients with infarctive adenomas (4.4 $\pm$ 4.1 cm vs. 1.8 $\pm$ 0.8 cm; $P < 0.01$), but were otherwise equivalent. At an average last follow-up of 2.52 years (range, 0.1–6.7 years), resolution of ophthalmoparesis as a result of pituitary tumor apoplexy demonstrated the longest recovery course (range, 2.4 $\pm$ 2.2 months) compared with visual field deficits (range, 8.0 $\pm$ 9.9 days), headaches (range, 1.9 $\pm$ 3.0 days), or pituitary dysfunction (range, 2.0 $\pm$ 1.8 weeks; $P < 0.01$). All patients who presented with headaches ($n = 37$) and/or visual disturbances ($n = 22$) had complete resolution of symptoms at last follow-up, whereas 83.3% of patients who presented with ophthalmoplegia experienced resolution. Endocrinologic dysfunction remained relatively consistent after surgery.**

CONCLUSIONS: **Endoscopic transsphenoidal surgery can provide durable resolution of symptoms for patients presenting with pituitary tumor apoplexy. Recovery from headaches, visual, and pituitary dysfunction may be more rapid compared with ophthalmoparesis.**

INTRODUCTION

Pituitary tumor apoplexy is a clinical condition that occurs secondary to hemorrhagic or infarctive expansion of a pre-existing pituitary adenoma. It is associated with a high risk of neurological and endocrinologic morbidity if not treated in its early stages.[1-13] Clinically, patients experiencing pituitary tumor apoplexy often present with symptoms of acute, severe headache, vomiting, visual changes, pituitary dysfunction, and altered mental status.[1,4-6,14-18] Mass effect associated with pituitary apoplexy can result in compression of nearby neurological and neurovascular structures, such as the optic chiasm, optic nerves, or carotid arteries, and often result in endocrine dysfunction with onset of acute adrenal insufficiency.[5,19-21]

Although rare, pituitary tumor apoplexy is a well-known and well-documented clinical condition, occurring in 2%–7% of patients with pituitary adenomas.[1-3,5,14-16,22,23] It can be a result of tumor infarction, with the pituitary adenoma outgrowing or compromising its vascular supply and resulting in necrosis-related expansion and compression of the adjacent neurovascular structures.[10,12,13] In contrast, hemorrhage-related apoplexy results from bleeding into the tumor bed with mass effect primarily due to blood products. Pituitary tumor apoplexy was first described as a fatal pituitary tumor-associated hemorrhage in 1898 by Bailey.[1,5,6] In 1950, Brougham et al[2] fully described and named pituitary apoplexy for the first time in a manuscript describing five clinical cases.[1,5,6] Historically, pituitary tumor apoplexy was associated with severe disability and a high mortality rate. With incremental improvements to transsphenoidal approaches to the pituitary gland during the past century, relief of mass effect on the sellar and parasellar structures can be performed safely.[5-7,11,24]

Key words
- Hemorrhagic
- Infarction
- Pituitary adenoma apoplexy
- Transsphenoidal surgery

Department of Neurosurgery, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts, USA

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

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Despite the many reviews of the clinical presentation and surgical management of patients presenting with pituitary tumor apoplexy, it is unknown whether an infarctive versus a hemorrhagic subtype of pituitary tumor apoplexy has an impact on the time course of recovery of neurological dysfunction in the era of endoscopic transsphenoidal surgery. Furthermore, the time course of functional recovery after transsphenoidal surgery for this disease process has not yet been well defined in the modern endoscopic era.[15,16,25,26]

In this study we performed a retrospective medical record review to determine postoperative outcomes of all patients who underwent surgery for pituitary tumor apoplexy between April 2008 and November 2014 at a single center. Specifically, we evaluated the time course of recovery of visual field deficits, headaches, ophthalmoparesis, and pituitary axis among all patients who presented to our institution with either hemorrhagic or infarctive pituitary tumor apoplexy in an effort to advance clinical understanding of postoperative recovery.

METHODS

We retrospectively reviewed medical records for all patients who underwent endoscopic transsphenoidal surgery for pituitary apoplexy from April 2008 to November 2014 at a single site. All patients who had a prior history of transsphenoidal surgery were eliminated from the final analysis. Data analysis was performed using IBM SPSS Statistics version 23 (IBM Corporation, Armonk, New York, USA). For all tests, $P < 0.05$ was considered statistically significant.

RESULTS

Clinically and radiographically confirmed pituitary tumor apoplexy was identified in 42 patients between April 2008 and November 2014 (Table 1). Of these patients, 35 (85.6%) had radiographically confirmed hemorrhage-related pituitary tumor apoplexy and 7 (14.4%) had radiographically confirmed infarction-related pituitary tumor apoplexy. Patients who had hemorraghic and infarctive

Table 1. Patient Demographics, Clinical Presentation, and Past Medical History

	Total	Hemorrhagic Adenoma	Infarctive Adenoma	*P* Value
Number of patients (%)	42 (100)	35 (85.6)	7 (14.4)	—
Age (years)	55.4 ± 18.8	54.5 ± 18.5	59.9 ± 21.1	0.54
Gender male, *n* (%)	23 (56.1)	20 (57.1)	3 (42.9)	0.49
BMI	29.8 ± 5.0	30.5 ± 5.3	27.6 ± 3.1	0.07
Last follow-up, years, median (range)	2.52 (0.1–6.7)	2.4 (0.1–6.7)	3.2 (0.1–5.8)	0.18
Interval from diagnosis to surgery (days), median (range)	15 (1–60)	20 (1–60)	14 (1–60)	0.46
Preoperative symptoms				
Apoplexy	42 (100)	35 (100.0)	7 (100.0)	—
Weight gain	4 (9.8)	3 (8.5)	1 (14.3)	0.64
CN 3 palsy	8 (19.5)	5 (14.3)	3 (42.9)	0.07
CN 6 palsy	2 (4.9)	2 (5.7)	0	0.51
Headaches	37 (90.2)	30 (85.7)	7 (100)	0.28
Vision changes	22 (53.7)	18 (51.4)	4 (57.1)	0.77
Sexual dysfunction	4 (9.8)	1 (2.8)	3 (42.9)	<0.01*
Menstrual dysfunction†	1 (5.5)	1 (2.8)	0	0.65
Galactorrhea	2 (4.9)	2 (5.7)	0	0.51
Medical history				
Diabetes mellitus	9 (22.0)	7 (20.0)	2 (28.6)	0.62
Hypertension	19 (46.3)	17 (48.6)	2 (28.6)	0.33
Coronary artery disease	4 (9.8)	4 (11.4)	0	0.35
CVA	1 (2.4)	0	1 (14.3)	0.02*
Hyperlipidemia	16 (39.0)	14 (40.0)	2 (28.6)	0.56
Tobacco use	6 (14.6)	5 (14.3)	1 (14.3)	1.00
Morbid obesity	5 (12.1)	4 (11.4)	1 (14.3)	0.83

BMI, body mass index; CN, cranial nerve; CVA, cerebrovascular accident.
*Premenopausal women only.
†*P* value < 0.05 considered statistically significant.