Endoscopic Endonasal Surgery for Treatment of Pituitary Apoplexy: 16 Years of Experience in a Specialized Pituitary Center

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OBJECTIVE: **Symptomatic pituitary apoplexy is a rare but life-threatening condition caused by sudden hemorrhage or infarction of a pituitary adenoma. In the current study, we aim to evaluate the clinical presentation, management, and clinical outcomes in a cohort of patients who were treated for this condition in our center in the last 16 years.**

METHODS: **We performed a retrospective analysis of all patients who underwent endoscopic endonasal surgery for treatment of symptomatic pituitary apoplexy between 2001 and 2016 in our center.**

RESULTS: **A total of 39 patients were included in the study, mean age of 54.9 years (range, 18–70 years) and mean follow-up 5.1 years (range, 0.6–16 years). Most of the patients had nonfunctioning adenomas (32 patients). Headache (89%), visual impairment (79%), and hypopituitarism (86%) were the most common preoperative findings. Surgical treatment led to gross total resection in 31 patients (79.4%). During follow-up, visual fields and oculomotor improvement was observed in 23 (74.1%) and 21 (67.7%) of the patients, respectively. Intractable headache also improved in all patients. Hypopituitarism was present in 77% of patients after surgery. In this series, no cerebrospinal fluid leak, vascular injury, or infection was observed. There was no postoperative mortality.**

CONCLUSIONS: **The endoscopic endonasal transsphenoidal approach is an effective modality to treat pituitary apoplexy with a high rate of success and minimal risk in selected cases. Although reversion of preoperative visual deficits is often observed, hormonal deficits tend to persist, and require long-term hormonal therapy, even after successful endoscopic endonasal surgical resection.**

INTRODUCTION

Symptoms associated with acute pituitary and visual dysfunctions were first reported by Bailey in 1898. However, the name pituitary apoplexy was coined only in 1950, by Brougham et al.[1] It is a rare but potentially life-threatening medical condition, more commonly present in patients with large pituitary adenomas.[1-3]

It usually occurs after a fulminant volume expansion of an infarcted or hemorrhagic pituitary adenoma that can be extended laterally into the cavernous sinus or superiorly displacing the optic chiasm.[4,5] The classic presenting features are acute headache, visual deterioration, dysfunction of oculomotor nerves because of cavernous sinus compression, hypopituitarism, with or without altered consciousness, and less frequently hydrocephalus caused by mass effect and subarachnoid hemorrhage. It also can course over hours to days, with subacute symptoms that may precede the full panorama of acute pituitary tumor apoplexy.[6-8]

Surgery remains the main treatment option for patients who present with progressive visual deterioration, oculomotor dysfunction, and decreased consciousness.[4,9] Surgery has the potential to rapidly reduce the tumor mass effect and improve visual, oculomotor, and hormonal deficits. Timing of surgery has been debated, with potential clinical benefits of early surgical intervention.[10,11] Conservative treatment may be selected in cases

Key words
- Apoplexy
- Endonasal
- Endoscopy
- Pituitary
- Surgery

Abbreviations and Acronyms
CSF: Cerebrospinal fluid
CT: Computed tomography
DI: Diabetes insipidus
GH: Growth hormone
MRI: Magnetic resonance imaging

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that present with radiologic finding of intratumoral hemorrhage but with no major clinical symptoms, and that are therefore not true apoplexy.

In this study, we aim to report the results of endoscopic endonasal surgery for treatment of pituitary apoplexy in a dedicated pituitary program in the last 16 years.

PATIENTS AND METHODS

A prospectively acquired database of all patients who underwent endoscopic endonasal surgery at our institution between January 2001 and December 2016 was reviewed. Patients with pituitary apoplexy secondary to pituitary adenomas were selected for chart review. A team composed of neurosurgeons, ear, nose, and throat surgeons, endocrinologists, and a neuro-ophthalmologist was responsible for the care of all patients.

Patient Selection

Only patients presenting with clinical (history of sudden onset of severe headache, ophthalmoplegia, visual field defects or altered mental status) and radiologic (signs of intra-adenoma bleeding) finds of pituitary apoplexy were included in the study.

Patients who presented with radiologic signs of intra-adenoma bleeding but had no clinical signs of pituitary apoplexy were not included for analysis.

Patient Evaluation

All patients were initially admitted in the neurosurgical emergency unit and underwent neurologic, endocrinologic, and neuro-ophthalmic assessment. The endocrinologic investigation included measurements of free thyroxin, thyroid-stimulating hormone, luteinizing hormone, follicle-stimulating hormone, testosterone, estrogen, prolactin, cortisol, human growth hormone (GH), and insulin growth factor 1. The presence of hypopituitarism was defined by proven biochemical deficiency of at least 1 endocrine axis. The existence of possible precipitating factors for pituitary apoplexy was also explored. All patients underwent computed tomography (CT) of the paranasal sinuses and magnetic resonance imaging (MRI) of the brain and sella region. After transsphenoidal surgery, histopathologic and immunohistochemical staining were performed in all specimens collected. Routine follow-up visits were scheduled 3 and 6 months after surgery and yearly thereafter. Hormonal evaluation was performed before every follow-up appointment and radiologic evaluation with MRI scans of the sella region was performed 3 months after surgery and then once a year.

Treatment Indication

The decision to proceed with surgical treatment was taken by our multidisciplinary team (neurosurgeon, endocrinologist, and neuro-ophthalmologist). Surgery was performed in patients who presented with deterioration of visual status and/or level of consciousness and intractable headache.

The patients without neuro-ophthalmic signs or mild or nonprogressive signs were treated conservatively and were not included in this series. No patient who was initially selected for conservative treatment required surgery on a second occasion.

Table 1. Presenting Symptoms at Admission

Presenting Symptoms	n	%
Headache	35	89.7
Visual field/function deficit	31	79.4
Ocular paresis	31	79.4
Nausea/vomiting	17	43.5
Altered consciousness level	6	15.3

All patients were operated by the same surgical team, led by the first author (J.A.G.).

Surgical Procedure

There was no significant difference regarding the technique used for the treatment of pituitary apoplexy and other pituitary adenomas. Details of the endoscopic endonasal surgical technique used in our department have been previously described.[12-15]

RESULTS

Clinical Features

A total of 39 patients (27 male; 69.2%) fulfilled the criteria for the study. Headache was the most common symptom (35 patients, 89.7%), followed by visual field deficit (31 patients, 79.4%), and ocular paresis (31 patients, 79.4%). The mean age at diagnosis was 54.9 (range, 18–70) years. Patients were followed for 0.6–16 years (mean follow-up, 5.1 years) (Table 1).

Most patients had nonfunctioning adenomas (32 patients, 82%). Secreting adenomas were observed in 7 patients (17.9%): 4 GH-secreting adenomas (10.2%) and 3 prolactinomas (7.6%). Pituitary apoplexy was the clinical manifestation that led to the diagnosis of a pituitary tumor in 38 patients (97.4%). Only 1 patient had been previously diagnosed with a pituitary adenoma. Comorbidities included hypertension (16 patients, 41%), diabetes mellitus (8 patients, 20.5%), epilepsy (3 patients, 7.6%), and psychiatric disorders (1 patient, 2.5%). Potentially associated factors were detected in 6 patients (15.3%) (Table 2). All patients in the study had macroadenomas (19–42 mm). The mean interval time from diagnosis to surgery was 4 days (range, 1–9 days). The indications for proceeding with surgery included worsening of

Table 2. Precipitating Factors in Pituitary Apoplexy

Precipitating Factors	n	%
Aspirin	2	5.1
Cardiac surgery	1	2.5
Somatostatin analogue	1	2.5
Contraceptive	1	2.5
Brain trauma	1	2.5
Total	6	15.3