



Causes of Complications and Unplanned Early Readmissions in Endoscopic Pituitary Adenoma Surgery; Early Results of a Single-Center Study

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Abstract

Introduction: We aimed to reveal the complications, the early results of surgery and the reasons for early readmissions that may occur in a neurosurgery team that has just started endoscopic pituitary surgery.

Methods: A retrospective analysis of patients with pituitary adenoma who were operated on in our clinic was performed. The patients were examined in terms of age, gender, and pathological diagnosis, whether there was a disorder in pre-operative hormone levels, post-operative complications, surgical and endocrine complications developed in the post-operative period, complaints, and findings during the planned and unplanned readmissions within the first 30 days.

Results: Of the 23 patients included in the study, 13 were male and 10 were female. The ages of the patients ranged from 22 to 68 (mean 49.3). Intraoperatively cerebrospinal fluid leakage was observed during surgery in 4.3% of the patients, and sixth cranial nerve paralysis was observed in 4.3% of the patients as an additional surgical complication. As an endocrine disorder, diabetes insipidus developed in 13% of the patients in the post-operative period; however, the findings were temporary in 66.6% of these patients. In the first routine follow-up examination after discharge, no complaints were observed in 82.6% of the patients, anosmia was observed in 4.3%, cacosmia in 4.3%, and runny nose in 4.3% of patients. Unrelated to the routine control examination, 26% of the patients admitted to the hospital unplanned in the first 30 days postoperatively, and the complaints were neck pain, rhinorrhea, headache, nausea-vomiting, double vision, and epistaxis.

Discussion and Conclusion: The results of this study showed that during the follow-up period, neurosurgeons should pay emphasis to transient diabetes insipidus, rhinorrhea, hormonal failure, and sixth cranial nerve paralysis. Complication rates in clinics new to the procedure are similar to the existing literature due to the widespread use of endoscopic pituitary surgery, the ease of learning the surgical procedure, and the fact that challenging cases are not selected in the first stage of surgery.

Keywords: Adenoma; complication; pituitary; readmission.

Adenomas of the pituitary gland are the third most frequent kind of brain tumor, accounting for up to 15% of all intracranial neoplasms^[1,2]. Many pituitary adenomas are diagnosed as asymptomatic incidentalomas that do not require treatment^[3]. Adenomas, on the other hand, might show clinically with symptoms of hormonal secretion disorders, as well as signs of mass effect as headaches and visual impairment^[4].

Surgical approaches to pituitary adenomas have been applied intracranially or transsphenoidally with microscopic methods for many years, but the use of endoscopy in pituitary surgeries has been increasing day by day, especially in the past 20 years. Because of the greater field of vision, better lighting, and enhanced identification of important neurovascular structures, the endoscopic method has raised attention on the ability to maximize tumor removal

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Submitted Date (Başvuru Tarihi): 17.06.2022 **Revised Date (Revize Tarihi):** 17.06.2022 **Accepted Date (Kabul Tarihi):** 04.07.2022

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while preserving normal pituitary gland function^[5]. With the increasing role of endoscopy, transsphenoidal pituitary surgery has evolved into a safe and low-morbidity surgery with increasingly shorter hospital stays.

On the other hand, complications and unexpected re-admissions to the hospital are inherent in all surgeries and can also be seen in endoscopic pituitary surgeries. However, these complications and readmissions can be a burden for both patients and the health-care system, but the learning curve, like all new surgical procedures, can have a significant impact on outcomes. For this reason, it is of great importance to understand the characteristics of the patients, the effects of the surgery, and the effective conditions to determine the causes of readmissions and complications.

In this study, we aimed to reveal the complications, the early results of surgery, and the reasons for early readmissions that may occur in a neurosurgery team that has just started endoscopic pituitary surgery.

Materials and Methods

A retrospective analysis of cases with pituitary adenoma who were operated on in the Neurosurgery Clinic of Ümraniye Training and Research Hospital between November 2021 and May 2022 was performed. Transsphenoidal endo-

scopic surgery was performed in all of the patients included in the study as a surgical method. All patients were operated on by the same team of primary surgeon and neurosurgery resident, using the same operating room and surgical equipment. The patients were examined in terms of age, gender, and pathological diagnosis, whether there was a disorder in pre-operative hormone levels, post-operative complications, surgical and endocrine complications developed in the post-operative period, complaints, and findings during the planned and unplanned admissions within the first 30 days. The patients' reviews were performed retrospectively from the patient charts; therefore, no ethics committee approval or patient consent form was required.

Results

Of the 23 patients included in the study, 13 were male and 10 were female. The ages of the patients ranged from 22 to 68 (mean 49.3). The complaints of the patients at the first admission were 69.5% (13) headache, 13% (3) vision loss, 13% (3) weight gain, 8.6% (2) enlarged hands and feet, 4.3% (1) menstrual irregularity, and 4.3% (1) difficulty in upward gaze. In the visual field examinations performed during the first admission examinations, 43.4% of the patients had visual field defects, while 4.3% (1 patient) had sixth nerve paralysis (Table 1). In the pre-operative laboratory

Table 1. Characteristics of operated patients

No	Age	Sex	Eye Examination	Pathologic Diagnosis	Complication	Postop 2 nd week exam	Reason for re-admission
1	41	M	Visual field defect	Prolactinoma	None	Normal	Neck pain
2	47	F	Visual field defect	Gonadotrope	None	Normal	None
3	66	F	Normal	Cushing	None	Normal	Exitus (pneumonia)
4	44	M	Visual field defect	Gonadotrope	None	Anosmia	Headache
5	54	F	Normal	Cushing	None	Normal	None
6	41	M	Visual field defect	Acromegaly	None	Normal	None
7	54	M	Normal	Acromegaly	CSF leak	Normal	None
8	42	M	6th nerve palsy	Non-functional	None	Normal	Rhinorrhea
9	54	F	Normal	Cushing	None	Normal	None
10	31	F	Normal	Cushing	None	Normal	None
11	22	F	Normal	Cushing	None	Runny nose	None
12	63	F	Visual field defect	Non-functional	DI	Normal	None
13	51	M	Visual field defect	Non-functional	None	Normal	Nausea/Vomiting
14	52	M	Visual field defect	Non-functional	None	Normal	None
15	24	F	Normal	Prolactinoma	None	Cacosmia	None
16	53	M	Visual field defect	Prolactinoma	Temporary DI	Normal	None
17	68	M	Visual field defect	Gonadotrope	None	Normal	None
18	58	F	Normal	Gonadotrope	6th nerve palsy	Normal	Diplopia
19	41	M	Visual field defect	Corticotrope	None	Normal	None
20	51	M	Normal	Non-functional	None	Normal	None
21	55	M	Normal	Gonadotrope	None	Normal	None
22	55	F	Normal	Non-functional	Temporary DI	Normal	Epistaxis
23	67	M	Normal	Gonadotrop	None	Normal	None

M: Male; F: Female; CSF: cerebrospinal fluid; DI: diabetes insipidus.

tests, hormonal failure was observed in 47.8% (11 patients) patients and 8.6% of patients were using levothyroxine due to thyroid dysfunction.

Intraoperatively, cerebrospinal fluid leakage was observed during surgery in 4.3% (1) of the patients and sixth cranial nerve paralysis was observed in 4.3% (1) of the patients as an additional surgical complication. As an endocrine disorder, diabetes insipidus developed in 13% (3) of the patients in the post-operative period; however, the findings were temporary in 66.6% (2) of these patients. Contrast-enhanced pituitary magnetic resonance imaging was performed for routine control in all patients within the first 24 h postoperatively; total excision was observed in 91.3% of patients, and tumor rest was observed in 8.6% of patients (Figs. 1 and 2).

In the first routine follow-up examination after discharge, no complaints were observed in 82.6% (19) patients, anosmia was observed in 4.3%, (1) cacosmia in 4.3%, (1) and runny nose in 4.3% (1) patients. Rhinorrhea could not be detected as a result of the examinations performed on the patient with a runny nose. Unrelated to the routine control examination, 26% of the patients admitted to the hospital

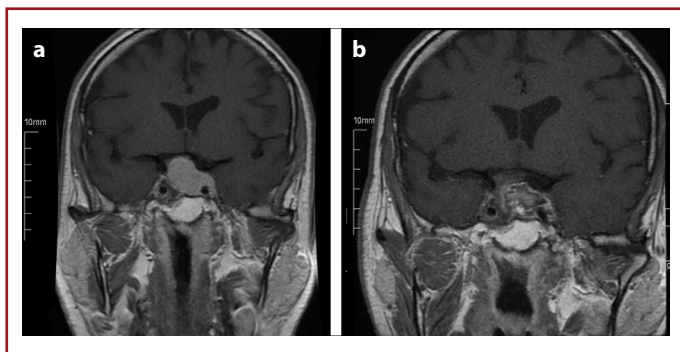


Figure 1. (a) Pre-operative (b) Post-operative post-contrast T1 sequence magnetic resonance imaging of patient 1.

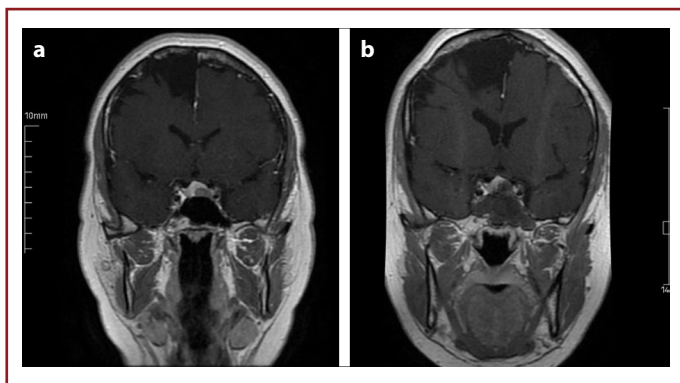


Figure 2. (a) Preoperative (b) Post-operative post-contrast T1 sequence magnetic resonance imaging of patient 5.

unplanned in the first 30-day postoperatively, and the complaints were neck pain (4.3%), rhinorrhea (4.3%), headache (4.3%), nausea-vomiting (4.3%), double vision (4.3%), and epistaxis (4.3%). One patient who applied to the emergency department with respiratory distress was transferred to the intensive care unit due to pneumonia and then died due to COVID-19.

Discussion

Transsphenoidal pituitary surgery has become an increasingly safe procedure with a relatively low (<1%) risk of mortality, and with advanced techniques and new instrumentation, patients undergoing transsphenoidal pituitary surgery require increasingly shorter hospital stays^[6]. Since the introduction of the idea of “pure” endoscopic endonasal transsphenoidal surgery in 1996, various teams throughout the world have begun to use it to treat pituitary adenoma^[7].

While pituitary adenoma is a condition that most people are unaware of, its general clinical appearance can be deceiving even to a general practitioner. The primary symptom described is vision impairment, thus patients are sent to an ophthalmologist before consulting a neurosurgeon. The diagnosis might be made during a woman's infertility evaluation. Because of this, it is possible that the majority of the people in the research experienced macroadenoma symptoms. In the majority of the patients examined in our study (69.5%), the diagnosis was made after MRI due to headache, while the rest were diagnosed during the investigation of vision loss, weight gain, acromegaly, menstrual irregularity, and upgaze palsy. Apoplexy was observed in one patient in our study and it can be observed in up to 25% of patients who were treated surgically for pituitary adenomas in the literature^[8].

While the complication rate of patients undergoing transsphenoidal pituitary surgery varies between 8.9 and 32.5% in the literature, most complications are temporary^[9-12]. Complications can be both primarily surgical and endocrine complications. While neurosurgical complications are more life-threatening complications, their incidence is low and patients are more affected by endocrine disturbances^[12]. When the patients in our study were analyzed, surgical complications were observed in 8.6% of the patients. The incidence of internal carotid injury, which is a fatal complication, varies between 0 and 5% in the literature and was not observed in the cases included in our study^[13,14]. Postoperatively, 1 patient (4.3%) who presented with the complaint of runny

nose was hospitalized with the diagnosis of rhinorrhea. In the literature, this complication is observed between 2.7% and 4.4% of endoscopic cases, which is similar to our study^[15,16]. Strickland et al.^[17] showed in their study, half of the patients presenting with rhinorrhea do not have cerebrospinal fluid leakage during the operation. Similar to that study, cerebrospinal fluid leakage was not observed during surgery in this patient, either. After admission to the hospital, repair of the cerebrospinal fluid leak was performed and the patient was followed up with lumbar drainage. The patient was discharged after the rhinorrhea resolved. Diabetes insipidus was observed as an endocrine disorder in 13% of the patients in the postoperative period, but the disorder in 66.6% of the patients with diabetes insipidus was temporary. Our intraoperative surgical complication rates may have been observed to be low compared to the literature, due to the fact that we do not prefer challenging cases in the initial phase of endoscopic pituitary surgery in our clinic.

In our study, in which we primarily investigated the reasons for the unplanned admission of patients to the neurosurgery clinic within the first 30 days, all of the patients applied to the neurosurgery outpatient clinic during the planned 2nd-week follow-up examinations. In the control examinations, complaints were observed in 3 (13%) patients, while the remaining 20 patients (82.6%) did not have any complaints. These patients, whose complaints were olfactory disorders and nasal discharge, were examined together with the otolaryngology department, and no pathology requiring intervention was observed. Six patients made unplanned readmission related to surgery and these patients were also examined together with the relevant departments, if necessary. Since no pathology was observed in the computed tomography and magnetic resonance imaging scans of the patient who presented with neck pain, it was thought that the patient's pain might be position-related (possibly because of Mayfield frame) muscle-joint pain. No pathology was observed in the imaging studies of the patients who presented with headache and nausea-vomiting and analgesic treatment was started for the patient's complaints. In the control examination, the patient's complaint was regressed. The patient, who had 6th cranial nerve palsy in the post-operative period, applied to the outpatient clinic with the complaint of diplopia after discharge, and the patient was referred to the ophthalmology department, but no improvement was observed in the complaints. In the post-operative MRI, it was thought that the sixth nerve paralysis might be due to a late thrombosis in the cavernous sinus. In the patient who applied

with respiratory distress, the patient was consulted to the endocrinology and was admitted to the internal medicine service for the examination of the patient. The patient was examined for electrolyte imbalance and hormonal imbalances but no pathology was observed. The patient was referred to the intensive care unit with the diagnosis of pneumonia and died due to COVID-19.

The limitations of our study were its retrospective nature and small number of patients. Prospective studies on the subject with more patients may provide much more awareness about the possible outcomes for neurosurgeons who will begin endoscopic pituitary surgery.

The results of this study showed that during the follow-up period, neurosurgeons should pay emphasis to transient diabetes insipidus, rhinorrhea, hormonal failure, and sixth cranial nerve paralysis. Complication rates in clinics new to the procedure are similar to the existing literature due to the widespread use of endoscopic pituitary surgery, the ease of learning the surgical procedure, and the fact that challenging cases are not selected in the first stage of surgery.

Ethics Committee Approval: Ümraniye Training and Research Hospital Ethics Committee (B.10.1.TKH.4.34.H.GP.0.01/314 - 29/09/2022).

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept: M.U.E.; Design: M.U.E.; Data Collection or Processing: S.O.A., M.U.E.; Analysis or Interpretation: S.O.A., M.U.E.; Literature Search: S.O.A.; Writing: S.O.A.

Conflict of Interest: None declared.

Financial Disclosure: The authors declared that this study received no financial support.

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