Pituitary Tumor Recurrence Rate using Endoscopic Endonasal Transsphenoidal Approach to the Skull Base

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Introduction

Pituitary tumors have historically challenged neurosurgeons and otolaryngologists. The endoscopic endonasal transsphenoidal approach (EEA) has emerged as the most widely used technique to resect pituitary tumors, primarily because it offers improved visualization and reduces post-operative complications (Figure 1). Despite its prevalence, long-term studies (greater than four years) on pituitary tumor recurrence rates (RR) and complications have not been conducted. Present literature is largely limited to two years of follow-up due to logistical constraints of follow-up on patients that may not be symptomatic.

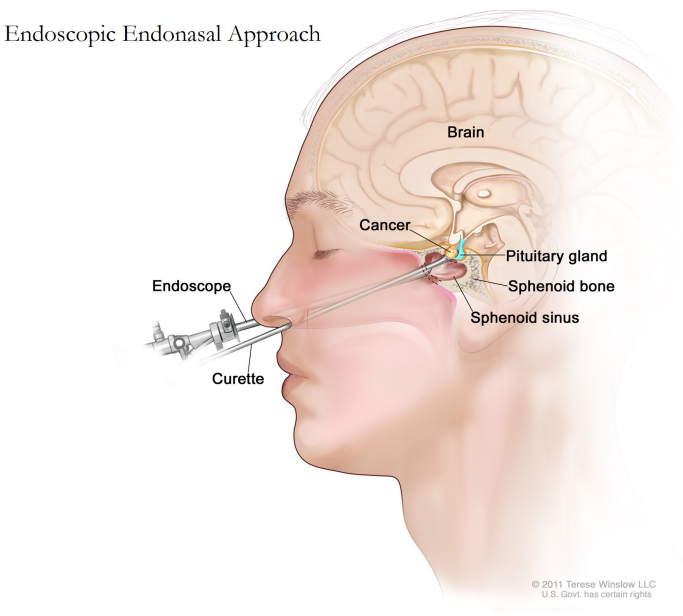

Figure 1

Learning Objectives

By the conclusion of this session, participants should be able to understand the importance of EEA in resecting pituitary tumors. They will appreciate the knowledge gap that is being filled in regard to long-term follow up, as current follow-up is largely limited to two years. Participants will also be able to discuss methods in encouraging more patients that undergo EEA for their tumor resections to continue follow-up even after four years have transpired post-surgically.

Methods

During the time period 2003-2015, over 300 patients had transsphenoidal surgery using EEA to remove pituitary tumors. 25 (8%) had follow-up of > 4 years. This represents the study's sample. Inclusion criteria was as follows: patients with post-operative MRIs > 4 years and had tumors that strictly only involved the pituitary gland. Questionable tumor recurrences were reviewed and confirmed by board certified neuroradiologists.

The same neurosurgeon (Dr. Melvin Field) completed all of these surgeries at the same site: Florida Hospital Orlando. This retrospective study analyzed the following variables:

- tumor size, tumor region, pathology of tumor, previous resection history
- intraoperative cerebrospinal fluid (CSF) leak
- tumor recurrence rate (RR).

The variables (tumor recurrence and CSF leak) were expressed as categorical variables, either positive or negative.

Results

In general, literature cites 20-40% tumor RR. In this study, three patients (12%) had evidence of recurrence (Table 1); their tumors' characteristics are outlined in Table 2. Two out of the three patients with tumor recurrence took 72 and 55 months, respectively, to show evidence on MRI.

Tumor Recurrence

Tumor Type	Average Tumor Dimension (cm)	Number of Patients	Number that Recurred
Null Cell	2.5	12	1
GH Secreting	2.4	5	0
FSH Secreting	2.1	3	0
ACTH Secreting	0.9	2	1
Prolactin Secreting	1.1	2	0
Pluripotent	3.0	1	1

Table 1

Tumor Recurrence Characteristics

Tumor Type	Original Tumor Dimension (cm)	Tumor Region	Previous Resection History	Months Until Tumor Returned
Null Cell	2	Sellar	No	72
ACTH Secreting	1.2	Parasellar	Yes	10
Pluripotent	3	Suprasellar	No	55

Table 2

Tumor region means location of the original tumor, and previous resection history implies that there was a previous resection completed before Dr. Field completed the initial tumor removal.

Results continued

12% of patients were found to have a tumor recurrence in comparison to the 34.1% long-term tumor RR cited in literature for transsphenoidal hypophysectomy($X^2(1)>4.08, p<0.05$). The comparison benchmark's study involved 85 patients that had ACTH Secreting Adenomas with a mean follow up of 53 months.

4% of patients had evidence of a CSF leak compared to 2.7% CSF leak rate for transsphenoidal hypophysectomy($X^2(1)=0.128, p>0.05$). The comparison benchmark's study involved 148 patients that had ACTH Secreting Adenomas.

Discussion

- Out of the 25 patients that had > 4 years of follow-up using EEA, three patients had tumor recurrence. Two of these three patients had a tumor recurrence more than four years after the initial surgery. This indicates the importance of continued imaging and follow-up for patients' safety.
- There was statistical significance shown between EEA and transsphenoidal hypophysectomy for tumor recurrence. This study highlights the viability of the newer surgical approach over the traditional approach, primarily due to greater visibility of the tumor. This facilitates greater gross tumor resection and thereby decreased likelihood of a recurrence.
- For CSF leaks, EEA would theoretically be expected to have higher rates of this operative complication because wider resection is possible with this surgical approach. However, there was no statistical significance shown between EEA and transspheonidal hypophysectomy with respect to CSF leak.
- This study was more controlled because there is a single neurosurgeon using EEA. However, since it only includes one surgeon, these outcomes may not be as applicable to other surgeons who have varying skillsets.

References

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2. Bodhinayake I, Ottenhausen M, Mooney MA, et al. Results and risk factors for recurrence following endoscopic endonasal transsphenoidal surgery for pituitary adenoma. Clin Neurol Neurosurg. 2014;119:75-79. doi: 10.1016/j.clineuro.2014.01.020.