

# Surgical Results of Endoscopic Endonasal Transsphenoidal Surgery for Pituitary Adenoma with Special Focus on Complication Rate

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## ABSTRACT

**OBJECTIVE:** To assess the results of endoscopic transsphenoidal surgery for pituitary adenoma with a particular focus on complication rate.

**METHODOLOGY:** This retrospective descriptive case series of 45 consecutive patient studies included from the Neurosurgery unit, Hayatabad Medical Complex/MTI/ Peshawar, from August 2019 to July 2021. Patients of any age or gender who needed surgical removal of pituitary tumors were included. All non-pituitary lesions were excluded, including fungal lesions, angiofibroma, CSF rhinorrhea, craniopharyngiomas, and those managed conservatively. Pituitary adenomas were detected through MRI and biopsies from 45 patients with tumors. The outcome of the surgery, as well as any complications, were recorded. Data on demographic variables, the duration in the hospital, postoperative complications, and morbidity/mortality were collected. The data were analyzed with SPSS version 25.

**RESULTS:** There were 55.5% male and 44% female patients out of 45 cases. The average age was 42 years and five months. The most prevalent presenting complaint was headache (91%). The surgical outcome was good in microadenomas and macroadenomas (83% vs 65 %). In total, 76% of patients experienced early surgical symptom relief. Seventy-six percent of our patients reported immediate symptom reduction following surgery. CSF rhinorrhea 5(11%) was the most common complication. In 50% of the patients, a gross total resection was achieved.

**CONCLUSION:** Pituitary adenomas are treated by endoscopic endonasal transsphenoidal surgery, which had an acceptable postoperative consequence.

**KEYWORDS:** Endoscopic Endonasal Transsphenoidal Surgery, Pituitary Adenoma, Complication

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## INTRODUCTION

The pituitary gland is an organ of the neuroendocrine system, situated in the "sella turcica" at the base of the skull. It consists of two main parts adenohypophysis formed by the anterior and the medial parts; and the neurohypophysis created by the posterior region. The pituitary gland is responsible for homeostasis and reproductive function<sup>1</sup>. Pituitary adenomas are prevalent benign pituitary tumors that account for about 10% of all intracranial tumors and, globally, 17%<sup>2,3</sup>. There are different modalities to manage giant pituitary adenomas. Except for prolactinomas, surgery is generally the first-line treatment for the biggest pituitary tumors<sup>4</sup>. Its main goal is to do the safest excision feasible while maintaining neurological function. The two main approaches for sellar and para sellar pituitary tumors are transcranial (TC) and microscopic transsphenoidal surgeries (MTS).

However, since the late 1990s, the introduction of

endonasal endoscopic transsphenoidal surgery (EETS) has broadened the scope of transnasal approaches to these malignancies and the entire skull base<sup>5-7</sup>. For the two above techniques, for pituitary adenomas, the endoscopic endonasal transsphenoidal is more rationale for an excellent outcome<sup>8</sup>. Previously, these cancers were treated by transcranial or endonasal microscopic surgery. The microscopic limits the technique of in-depth perception and has a narrower field of view. The endoscopic procedure gets safer in dissection owing to a greater viewing field<sup>9</sup>. Larger pituitary tumors pose a challenge for the surgeon via the transsphenoidal approach. However, it still spawns good surgical results<sup>10</sup>. We have examined patients' data for two years undergoing transsphenoidal endoscopic techniques with a keen eye on operative and postoperative complications, incidence, and extent of Resection of pituitary tumors. The present study aimed to assess how well ETSS is for pituitary adenomas performed in terms of clinical outcomes and complications.

## METHODOLOGY

This retrospective descriptive case series of 45 consecutive patient studies included from the

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Neurosurgery unit, the Hayatabad Medical Complex/MTI/ Peshawar, from August 2019 to July 2021.

Patients of any age or gender who needed surgical removal of pituitary tumors were included. All non-pituitary lesions were excluded, including fungal lesions, angiofibroma, CSF rhinorrhea, and craniopharyngiomas. And those managed conservatively were also excluded. The patients' demographic and endocrinological characteristics and outcomes, such as the surgical excision extent, complications, and hospital stay length, were all assessed and evaluated. Data on demographic variables, the duration in the hospital, postoperative complications, and morbidity/mortality were collected. The data were analyzed with SPSS version 25.

## RESULTS

### **Patients' Demographics**

A total of 45 patients were included in the study. Twenty-five patients (55.5%) were male, and twenty patients (20%) were female (44.4%). The average age of the participants was 42 years and five months.

### **Presenting Complaints**

A headache was the most common presenting symptom, reported by 41 (91%) patients. Patients with poor visual acuity were detected in 28 (62%) cases, amenorrhea in 10 (22%) cases, and acromegaly in 13 (29%) cases. See Table I.

### **Surgical Outcome**

When patients with microadenomas and macroadenomas were compared, the surgical outcome was acceptable, i.e. (83% vs 65%). On the other hand, the tumors infiltrating the cavernous sinus had a poor prognosis, with just 25% improvement. See Table I. In total, 76 percent of patients experienced early surgical symptom relief.

### **Post-op Complications**

Nine out of forty-five patients had post-op complications. CSF rhinorrhea 5(11%) was the most common consequence, followed by diabetes insipidus 3(6.6%). No patients developed permanent diabetes; one died of cardiac arrest, and the other due to meningitis. Patients were monitored for 1 to 6 months after surgery on an outside basis. See Table I.

### **The extent of Resection**

At six weeks after surgery, a contrast MRI was used to assess the extent of the Resection. In our series, gross total Resection was obtained in 58.6%, near-total Resection in 35.22%, and subtotal Resection in 6.2% of cases.

## DISCUSSION

Pituitary tumors are difficult sellar area lesions to treat. Over the previous millennium, surgery has vastly advanced, and the use of endoscopy has been the most significant advancement. In our clinical environment of Neurosurgery Hayatabad Medical Complex, Peshawar, the current study described the retrospective clinical outcome and complications of

**TABLE I: SURGICAL RESULTS AND PRESENTATION (n = 45)**

Clinical Presentation	(n) %
Headache	(41) 91%
Decrease visual acuity	(28)62%
Amenorrhea	(10)22%
Acromegaly	(13)29%
<b>Surgical Outcome</b>	
Microadenoma	(37)83%
Macroadenoma	(29)65%
Tumour invading the cavernous sinus	(11)25%
<b>Post Op Complications</b>	
CSF Rhinorrhea	(5)11%
Diabetes insipidus(temporary)	(3)6.6%
Diabetes insipidus(permanent)	(0)0%
Post op hematoma	(1)2.2%
Mortality	(2)4.4%

endoscopic endonasal transsphenoidal surgery (ETSS) for pituitary adenomas<sup>11</sup>.

A headache was the most common presenting symptom, reported by 41 (91%) patients. Patients with poor visual acuity were detected in 28 (62%) cases, amenorrhea in 10 (22%) cases, and acromegaly in 13 (29%) cases. A study by Bokhari AR 2013<sup>12</sup> depicted that most common presenting symptoms were headache (87%) followed by visual deterioration in almost 69% of cases, which again correspond to our results.

When patients with microadenomas and macroadenomas were compared, the surgical outcome was acceptable, i.e. (83% vs 65%). On the other hand, the tumors infiltrating the cavernous sinus had a poor prognosis, with just 25% improvement. In total, 76 percent of patients experienced early surgical symptom relief. Constantino ER 2016<sup>13</sup> conducted a similar study showing the surgical outcome of 79% with macroadenoma involving the cavernous sinuses and 87% without invading the sinus. According to Mahmood K et al.<sup>2</sup>, pituitary adenomas can also be treated by pure endoscopic endonasal transsphenoidal surgery, which produces acceptable and reasonable outcomes and is a safe alternative to the classic Trans-sphenoidal microscopic method.

In our study, nine out of forty-five patients had post-op complications. CSF rhinorrhea 5(11%) was the most common consequence, followed by diabetes insipidus 3(6.6%). No patients developed permanent diabetes; one died of cardiac arrest, and the other due to meningitis. A study done by Guo K et al.<sup>15</sup> in their retrospective study found 18 cases of postoperative

pneumocephalus (7.17%), 9 CNS infections (3.59%), and 12 CSF leaks (4.78%).

At six weeks after surgery, a contrast MRI was used to assess the extent of the Resection. In our series, gross total Resection was obtained in 58.6%, near-total Resection in 35.22%, and subtotal Resection in 6.2% of cases. A study was done by Singh H 2016<sup>16</sup> depicted that gross total Resection was obtained in 64%, subtotal Resection in 15% and near-total in 39% of cases. The EETS should be performed in cases of pituitary adenoma where a greater field of vision and more space is desired for safer Resection of the tumour.

## CONCLUSION

EETS for pituitary adenomas achieves acceptable excision through a much more tolerable process and has sufficient postoperative problems. It is an effective procedure and can be employed as an alternative to the microscopic technique or the transcranial approach for pituitary adenomas.

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## AUTHOR CONTRIBUTIONS

Amir S: Conceived, concept design and definition of intellectual content, literature search, and data acquisition

Noman MA: Literature search and manuscript preparation, final layout and data interpretation

Ayub S: Data entry and final layout

## REFERENCES

1. Harary M, Dirisio AC, Dawood HY, Kim J, Lamba N, Cho CH et al. Endocrine function and gland volume after endoscopic transsphenoidal surgery for nonfunctional pituitary macroadenomas. *J Neurosurg.* 2018; 1-10. doi: 10.3171/2018.5.JNS.181054. Online ahead of print.
2. Mahmood K, Raza MH, Ali I, Afzal O, Ishfaq M, Kausar F et al. The Surgical Results in Pure Endoscopic Endonasal Trans-sphenoidal Surgeries in 403 Pituitary Adenomas: An 8-Years of Experience from a Single Neurosurgical Unit. *Pak J Neurol Surg.* 2020; 24(4): 315–21. doi: 10.36552/pjns.v24i4.500.
3. Oyama K, Tahara S, Hirohata T, Ishii Y, Prevedello DM, Carrau RL et al. Surgical anatomy for the endoscopic endonasal approach to the ventrolateral skull base. *Neurol Med Chir (Tokyo).* 2017; 57(10): 534-41. doi: 10.2176/nmc.ra.2017-0039.
4. Dixit S, Samanta N, Saha SK, Roy K, Ghosh P, Bachchan A. A study assessing the outcome of endoscopic endonasal transsphenoidal excision of pituitary adenoma at a tertiary care institutions- An Initial experience of 30 cases. *Asian J Med Sci.* 2018; 10(1): 53-60. doi: 10.10.3126/ajms.v10i1.21021.
5. Linsler S, Hero-Gross R, Friesenhahn-Ochs B, Sharif S, Lammert F, Oertel J. Preservation of hormonal function by identifying pituitary gland at endoscopic surgery. *J Clin Neurosci.* 2017; 43: 240-6. doi: 10.1016/j.jocn.2017.06.045.
6. Zhan R, Xin T, Li X, Li W, Li X. Endonasal Endoscopic Transsphenoidal Approach to Lesions of the Sellar Region in Pediatric Patients. *J Craniofac Surg.* 2015; 26(6): 1818–22. doi: 10.1097/SCS.0000000000001946.
7. Yu SY, Du Q, Yao SY, Zhang KN, Wang J, Zhu Z et al. Outcomes of endoscopic and microscopic transsphenoidal surgery on non-functioning pituitary adenomas: a systematic review and meta-analysis. *J Cell Mol Med.* 2018; 22(3): 2023–7. doi: 10.1111/jcmm.13445.
8. Alshami H, Alnemare AK, Mahfoz TB, Salah AM. Endoscopic Versus Microscopic Pituitary Adenoma: Comparative Study of Two Different Approaches. *Med J Cairo Univ.* 2020; 88(12): 2367–73. doi: 10.21508/MJCU.2020.125471.
9. Nishioka H. Recent evolution of endoscopic endonasal surgery for treatment of pituitary adenomas. *Neurol Med Chir (Tokyo).* 2017; 57(4): 151–8. doi: 10.2176/nmc.ra.2016-0276.
10. van Furth WR, de Vries F, Lobatto DJ, Kleijwegt MC, Schutte PJ, Pereira AM et al. Endoscopic Surgery for Pituitary Tumors. *Endocrinol Metab Clin North Am.* 2020; 49(3): 487–503. doi: 10.1016/j.ecl.2020.05.011.
11. Arafah BM, Nasrallah MP. Pituitary tumors: Pathophysiology, clinical manifestations and management. *Endocr Relat Cancer.* 2001; 8(4): 287-305. doi: 10.1677/erc.0.0080287.
12. Bokhari AR, Davies MA, Diamond T. Endoscopic transsphenoidal pituitary surgery: A single surgeon experience and the learning curve. *Br J Neurosurg.* 2013; 27(1): 44–9. doi: 10.3109/02688697.2012.709554.
13. Constantino ER, Leal R, Ferreira CC, Acioly MA, Landeiro JA. Surgical outcomes of the endoscopic endonasal transsphenoidal approach for large and giant pituitary adenomas: Institutional experience with special attention to approach-related complications. *Arq Neuropsiquiatr.* 2016; 74(5): 388–95. doi: 10.1590/0004-282X20160042.

14. Wang F, Zhou T, Wei S, Meng X, Zhang J, Hou Y et al. Endoscopic endonasal transsphenoidal surgery of 1,166 pituitary adenomas. *Surg Endosc.* 2015; 29(6): 1270–80. doi: 10.1007/s00464-014-3815-0.
15. Guo K, Heng L, Zhang H, Ma L, Zhang H, Jia D. Risk factors for postoperative intracranial infections in patients with pituitary adenoma after endoscopic endonasal transsphenoidal surgery: Pneumocephalus deserves further study. *Neurosurg Focus.* 2019; 47(2): E5. doi: 10.3171/2019.5.FOCUS19269.
16. Singh H, Essayed WI, Cohen-Gadol A, Zada G, Schwartz TH. Resection of pituitary tumors: endoscopic versus microscopic. *J Neurooncol.* 2016; 130(2): 309–17. doi: 10.1007/s11060-016-2124-y.



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