

# Open Versus Endoscopic and Microscopic Pituitary Adenoma Excision – An Institutional Experience

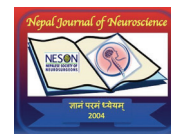
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## Abstract

**Introduction:** For symptomatic nonsecreting pituitary adenomas (PAs), surgical resection remains the treatment of choice. In this retrospective study, we compare the efficacy of open versus endoscopic and microscopic excision of pituitary adenoma, and to evaluate the merits and demerits of each approach.

**Material and Methods:** This study is a retrospective analysis of patients who underwent surgical excision for symptomatic pituitary adenoma in institute of neurosurgery, madras medical college from January 2022 to December 2022. Various parameters were analyzed including the age, sex, type of surgical resection done, duration of surgery, average blood loss, extent of resection of tumors, and intra- and post-operative complication.

**Results:** A total of thirty eight patients with pituitary adenoma were operated from January 2022 to December 2022. Six patients were operated by endonasal endoscopic transsphenoidal surgery and six patients were operated by microscopic transsphenoidal surgery, 26 patients were operated by Pterional craniotomy and excision of tumour. In an endoscopic and microscopic group, complete tumor excision was achieved in 8 patients (66.6%) and in open surgery group, it was achieved in 6 (23.1%) patients. In endoscopic and microscopic group, the mean operative time was  $120 \pm 25$  min (ranged 80–135 min) and in open surgery group, it was  $150 \pm 15$  min (ranged 130–175 min). In endoscopic and microscopic group, mean blood loss was  $120 \pm 30$  ml (80–160 ml), and in open surgery group, it was  $200 \pm 15$  (150–230 ml). Postoperative CSF leak from wound site was present in 1 case in open surgery group. There was no mortality in either group. Duration of hospital stay was 5 days in endoscopic and microscopic group and 14 days for open surgery group.

**Conclusion:** Endoscopic and microscopic approach provides a wide surgical field and broad lateral vision making easier distinction of tumor tissues. Thus, there is less blood loss, less operative time, less postoperative complication, and early discharge from the hospital.

**Key words:** Endoscopic, microscopic, pterional craniotomy, pituitary adenoma, transsphenoidal surgery.

## Introduction

Of all primary intracranial tumours, 10-25% accounts for pituitary adenomas (PAs)<sup>1,2</sup>. These tumours arise from the pituitary gland which is located in the sella turcica. Clinically these tumours are classified into non-

functioning pituitary adenomas (NFPAs) and functioning adenomas like prolactinomas (PRL), adrenocorticotrophic hormone (ACTH)-secreting, growth hormone (GH)-secreting or thyroid-stimulating hormone (TSH)-secreting adenomas<sup>3</sup>. These tumours may cause pressure effect on adjacent structures, leading to visual field impairment, hypopituitarism and sometimes ophthalmoplegia<sup>4</sup>. Surgical excision is the mainstay of treatment for all pituitary adenomas except prolactinomas via a transsphenoidal route to the sella turcica<sup>5</sup>.

The goal of surgery is gross total excision thereby to relieve the pressure to nearby structures and also to minimize the risk of relapse. Both immediate and long-term complications can arise from surgery close to the anterior pituitary cells and stalk, the optic chiasma and adjacent cranial nerves in the cavernous sinus<sup>6,7</sup>. CSF rhinorrhoea is the most common postoperative complications (7–15%)<sup>6,8</sup> and post operative hypopituitarism (22%)<sup>7</sup>.

Microscopic excision of pituitary adenoma was the standard approach for some time with complete tumour excision and with minimum postoperative complications<sup>9,10</sup>. In 1992, Jankowski et al.<sup>11</sup> demonstrated

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endoscopic transsphenoidal approach that improved the surgeon's ability to identify high-risk structures and to resect PAs with a supra- and parasellar extension. Now the endoscopic technique has been standardized and adopted worldwide as an alternative to the microscopic approach<sup>12,13</sup>. Even for large adenomas and those with supra and parasellar extension, endoscopic approach has proved promising<sup>14,15,16</sup>.

This study is a retrospective analysis of patients who underwent surgical excision for symptomatic pituitary adenoma in Institute of Neurosurgery, Madras Medical College from January 2022 to December 2022. Various parameters were analyzed including the age, sex, type of surgical resection done, duration of surgery, average blood loss, extent of resection of tumors, and intra- and post-operative complication.

## Materials and Methods

The inclusion criteria were patients with symptomatic pituitary adenomas at our department during 2022. Our study is retrospective, and patients were identified using the MMC In Patient and OT theatre registry .

### Surgical technique

**Endoscopic technique:** After induction of general anaesthesia, cottonoids with oxymetazoline hydrochloride nasal solution were placed for 10–15 min in each nostril. Neuronavigation with magnetic resonance imaging (MRI) and computed tomography (CT) was used to achieve endoscopic access to the sphenoid sinus (0° and 30° endoscopes coupled to a camera, Storz). Using a bi-nostril technique, the adenoma was removed using blunt curettes. Haemostasis was achieved with temporary placement of Spongostan. Hadad- Bassagasteguy flap placed. All patients were transferred to post operative ward and if there were no sign of early postoperative surgical complications, patients were routinely transferred to the neurosurgery ward the following day. **Open / Microscopic technique:** After induction of general anaesthesia, a pterional craniotomy performed followed by sylvian based durotomy and microscopic excision of the pituitary adenoms.

### Data Collection

Knosp<sup>16</sup> and Hardy (by Hardy and Vezina)<sup>22</sup> classifications were used to classify adenoma extension based on the patients preoperative MRI . Tumour remnant volume was calculated on routine follow-up MRI scans performed 4–6 months after surgery.. Duration of surgery and complications (CSF rhinorrhoea, infection, intracranial haemorrhage and the need for additional surgery) within 30 days were registered.

Biochemical data. Pituitary hormones were assessed preoperatively and six weeks postoperatively . During the postoperative hospital stay, patients were monitored for the development of diabetes insipidus (DI) and hypopituitarism.

**Visual field impairment.** Vision was evaluated pre- and postoperatively in all patients able to cooperate. Visual field was evaluated by quadrant affected (upper-lower temporal/ upper-lower nasal) combined with mean deviation in decibel for each eye. Central visual impairment was determined by rapidly declined vision on the Snellen chart or blindness. Based on the mean deviations, vision in each eye was categorized as intact vision, peripheral field impairment or central visual impairment.

### Statistical Analysis

Student's t-test and chi-squared test is used. p-values < 0.05 was regarded as statistically significant.

## Results

A total of thirty eight patients with pituitary adenoma were operated from January 2022 to December 2022 . Six patients were operated by endonasal endoscopic transsphenoidal surgery and six patients were operated by microscopic transsphenoidal surgery, 26 patients were operated by Pterional craniotomy and excision of tumour.

In our study, gross total excision of pituitary adenoma was achieved in 8 patients ( 66.6%) by endoscopic/microscopic approach and in 6 patients (23.1%) in open surgical approach. The p-value is 0.005 which is significant.

In our study , for the endoscopic and microscopic group, the mean operative time was 120 ±25 min (ranged 80–135 min) and in open surgery group, it was 150 ± 15 min (ranged 130–175 min). The p value is < 0.001 which is significant.

In endoscopic and microscopic group, mean blood loss was 120 ± 30 ml (80–160 ml), and in open surgery group, it was 200 ± 15 (150–230 ml). The p-value is 0.004 which is significant.

In our study , 34 out of 38 cases had visual disturbance. Of these 34 cases , 5 patients had diminished visual acuity as they had only perception to light . Remaining 29 cases had bitemporal hemianopia. Out of 34 cases , 25 cases underwent open pituitary adenoma excision and 9 cases underwent endoscopic excision. Visual disturbance was static in 2 cases in each group and rest 25 cases had improvement in visual disturbance . p value is not significant.

Postoperative CSF leak from wound site was present in 1 case in open surgery group. There was no CSF

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rhinorrhea in endoscopic / microscopic group. There was no mortality in either group.

In our study, post operative transient diabetic insipidus was found in 76% in open transcranial approach as compared with 33% in endoscopic transnasal approach. p value 0.4 which is not significant .

Duration of hospital stay was 5 days in endoscopic and microscopic group and 14 days for open surgery group.

### Discussion

Our study is a retrospective study of patients with pituitary adenoma admitted in our hospital over a period of one year(2022) who were subjected to excision of pituitary adenoma either by open pterional approach or by endoscopic/microscopic approach. In this study we evaluated the advantages of one over the other approach.

In our study , gross total excision rate was significantly higher in endoscopic group compared to open group . This is similar to previous studies conducted by Li et al, Messerer et al, Razak et al.<sup>15,17,18</sup>.

In our study the average blood loss was significantly lower in endoscopic transnasal excision when compared to open transcranial excision of pituitary adenoma.

In our study , the duration of surgery was significantly less in endoscopic group which is comparable to previous studies conducted by Eseonu et al<sup>19</sup>.

In our study the visual outcome was similar in both approaches . This is in comparison to the previous study done by Muskens et al<sup>21</sup>.

In our study, post operative transient diabetic insipidus was found less in endoscopic transnasal approach of pituitary adenoma excision compared to open transcranial approach which is comparable to studies conducted by Messerer et al and Choe J. H et al<sup>17,20</sup>.

*Table 1 : Surgical approach*

Surgical approach	Number of cases
Endoscopic transsphenoidal resection	6
Microscopic transsphenoidal resection	6
Pterional craniotomy and excision of pituitary adenoma	26
<b>Total</b>	<b>38</b>

*Table 2: Total vs partial excision of pituitary adenoma*

Surgical approach	Total cases done	Gross total excision	Partial excision	P value
Endoscopic/microscopic excision of pituitary adenoma	12	8	4	P value 0.005 significant
Open pterional excision of pituitary adenoma	26	6	20	

*Table 3: Duration of surgery*

Surgical approach	Operative time	P value
Open pterional approach	130- 175 min	< 0.001 significant
Endoscopic/microscopic approach	80- 135 min	

*Table 4 : Average blood loss*

Surgical approach	Average blood loss	P value
Open pterional approach	200 ml	0.004 Significant
Endoscopic/microscopic approach	120 ml	

*Table 5: visual disturbance and outcome*

	Total -34 Cases	Open pterional approach	Endoscopic approach
1. Vision Acuity (Only PI)	5 Cases	4 Cases	1 Case
2. Bitemporal Hemianopia	29 Cases	21 Cases	8 Cases
Visual Disturbance	Static	2 Cases	2 cases
Visual Outcome	Improved	19 (90%)	6 (75%)

## Conclusion

The endoscopic approach for excision of pituitary adenoma has better gross total excisions, shorter duration of surgery with minimal blood loss and complication rate including postoperative pituitary dysfunction as compared to conventional transcranial approach. The major drawback being stiff learning curve for endoscopic transnasal approach.

At the end endoscopic transnasal transsphenoidal excision of pituitary adenoma is a better choice for the patient in experienced hands, but simultaneously experience in pterional transcranial excision is inevitable.

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