

## STUDY OF TRANSNASAL TRANSPHENOIDAL APPROACH IN SELLAR AND SUPRASellar LESIONS

### Neurosurgery

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### ABSTRACT

Pituitary adenoma is the third most common intracranial tumor in surgical practice, accounting for approximately 10%–25% of all intracranial tumor [1, 2]. The aim of this study is to study the endoscopic transsphenoidal approaches for the sellar and suprasellar region tumors and outcome and complications in the patients operated by endoscopic endonasal transsphenoidal approaches. This study includes 60 cases of sellar and suprasellar tumors treated with endoscopic transnasal transsphenoidal surgery in VSGH and SVP hospital, Ahmedabad over the period of 5 years. In this study, the peak incidence of pituitary tumors was in 3rd decade with female preponderance. Most common complaint was visual disturbance followed by headache. Nonfunctioning pituitary adenomas (70%) were more common than functioning adenomas (30%). In functioning pituitary adenomas, prolactinoma was most common. The complications noted were transient diabetes mellitus (25%), csf leak (1.66%), CN palsy (1.66%). Our experience suggests that the endoscopic transsphenoidal approach offers a potentially safe viable, effective and cost economic treatment option in pituitary tumors which are difficult to remove by the standard microscopic approaches.

**SUMMARY-** In the present study most common age group of patient affected by pituitary tumors were of 3rd decade followed by 4th decade. Females were more affected than male patients. Most common symptoms was visual disturbance in the form of decreased vision followed by headache. 2nd Cranial nerve was most commonly affected in the present study and on perimetry examination, Bitemporal Hemianopia was most common visual field defect which was seen in the patients who were having visual disturbance. In our study overall NFPA (70%) was more common than functioning pituitary adenoma. Among functioning pituitary adenomas, Prolactinoma (20%) followed by GH adenoma (5%) was found in most of our patients. MRI brain contrast with pituitary gland protocol is the gold standard investigation in pituitary tumor cases. Post operatively 15 patients (25%) were having transient diabetes insipidus and they were successfully treated. On follow up of patients, the relief from headache was seen in most of the patients and in all of our patients who were previously having visual disturbance, vision was improved after surgery.

### KEYWORDS

endoscopic transnasal transsphenoidal approach, sellar and suprasellar tumors, nonfunctioning pituitary adenoma, transient diabetes insipidus.

### INTRODUCTION

The pituitary gland, a small but important organ of the human body is a seemingly small extruded portion of the brain, lying underneath the proper cerebrum but inside the dura mater. It weighs only 0.6 grams, but evolution may have understood the importance of this organ as it is confined inside its own bony protection, the sella turcica.

The pituitary gland is the master gland of the endocrine system. It integrates signals from the hypothalamus, to which it is connected by the pituitary stalk and regulates the activity of the thyroid gland, the adrenal gland and the gonads. The pituitary is the conductor of the hormonal orchestra that maintains equilibrium in the body, and its function therefore affects every major organ system in the body.

Pituitary adenoma is the third most common intracranial tumor in surgical practice, accounting for approximately 10%–25% of all intracranial tumors<sup>[1, 2]</sup>. Recent epidemiological data suggest that clinically apparent pituitary adenomas have annual incidence of 3 to 94 cases per 100,000 in the general population<sup>[3,4]</sup>.

Tumors arising from the pituitary gland can produce hormones called hormonally active tumors, and tumors that do not produce hormones, are called hormonally silent tumors. These tumors may therefore causing both a problem of local mass effect and systemic hormonal hyperactivity, which make these tumors difficult to understand and necessitates a complex team presurgical work-up, including endocrinologists, ENT surgeons, ophthalmologists and neurosurgeons.

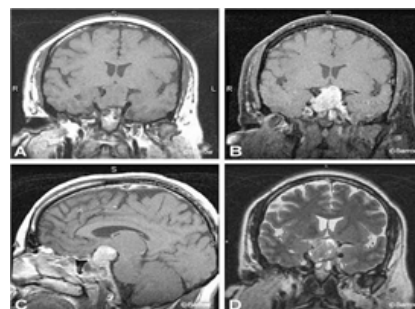
With advance in science and technology these pituitary tumors are identified earlier and surgical treatment are planned on early basis. In the today's era endoscopic approaches which are minimally invasive and are the standard of care for the management of various sellar tumors.

The objectives of the study is to study the endoscopic endonasal transsphenoidal approaches and outcome for the resection of sellar and parasellar tumors.

### MATERIAL AND METHODS

This study is a both prospective and retrospective study and it consists of analysis of 60 cases of sellar and suprasellar region tumors treated by endoscopic transnasal transsphenoidal route at Department of Neurosurgery, VS & SVP Hospital, Ahmedabad over the period of 5 years. The patients were included in the study between the age of 15 to 65 years of both sexes with sellar and suprasellar pituitary adenoma, who were fit and willing for surgery. Those patients who were unfit and unwilling for surgery were excluded.

The patients were assessed in detail by clinical history and general, systemic examination, and those patients require surgical intervention by endoscopic transnasal transsphenoidal route were admitted. The routine hematological and biochemical investigations as well as investigations required for anesthetics fitness were done. MRI of whole brain with pituitary protocol was done in all patients. All the patients studied were operated at the institute itself. Patient data was documented in case record form.



**Figure 1. Mri Brain With Contrast: Coronal And Sagittal**

In our institute, endoscopic transnasal transsphenoidal route is the commonly performed procedure in cases of sellar and suprasellar region tumors when indicated. Endoscope used: 0 degree and 30 degree. Patient are positioned to maximize exposure of the sellar region and to maintain surgeon's comfort and spatial orientation. The patient table is adjusted to a lawn chair position with torso elevated 20 to 30 degree and knee gently flexed. The table is tilted slightly right to facilitate the surgeon's reach. The patient head is supported over the

horse shoe head rest. The patient head is slightly tilted to the left and flexed so that the dorsum of the nose becomes parallel to the wall of the room as well as to the floor.

Nasal decongestion facilitates pituitary procedures in most patient, with possible exception of those with history of hypertension and coronary artery disease. After positioning, bayonet forceps are used to place oxymetazoline soaked cotton pledgets, followed by pledgets soaked in 1% lignocaine and 1:200,000 adrenaline, between septum and middle turbinate. The pledgets are allowed to remain in contact with the nasal mucosa for 5 to 10 minutes. The pledgets are removed after painting and draping. As routine preoperative antibiotic prophylaxis protocol Inj ceftriaxone 1 gm was given to all patient. Thigh area was prepared in all patient in case if fascia lata graft is required.



**Figure 2. Intraoperative Photograph**

#### NASAL PHASE:

The goal of nasal phase is to reach the sphenoid sinus via the sphenoid ostia and a posterior nasal septectomy. With help of 0 degree endoscope inferior turbinate laterally and nasal septum medially identified. The middle turbinate is lateralized while avoiding excess mucosal injury. Now the sphenoid ostium is identified 1.5cm above the choana. Now the incision was taken at junction of bony and cartilaginous septum. The mucosa is dissected to create a posterior tunnel that expose the surface of the sphenoid sinus.

#### Sphenoid Phase:

The sphenoid surface of a pneumatized sinus can be entered after the enlargement of the ostia. Care was taken to avoid injury to the sphenopalatine artery as it emerge near the inferolateral vomer. The mucosa within the sphenoid sinus was removed to reduce risk of postoperative mucocoele. The surgical view at this point was sellar floor at the centre, planum sphenoidale superiorly, rostral clivus inferiorly, the wings of the optic nerve were superolaterally with respect to the sella.

#### Sellar Phase:

Using a blunt nerve hook, an initial small opening was made after verification of the midline. The bony window was widened to reach the sellar floor. Now the small vertical dural opening was made with help of knife. Now the intrasellar tumor dissection was started first the inferior and lateral mass was removed to all the superior portion to descend into the surgical field and later the remaining part was removed with the help of forceps and suction. The tumor was also sent for histopathological examination. After adequate hemostasis and confirming that there is no csf leak the procedure was completed. The surgical were kept at operative site whenever required. Postoperatively, analgesics and antibiotics were given for 1 to 2 days. Strict supine position was given till nasal packing present to prevent epistaxis. Urine output and electrolyte were strictly monitored. Serum electrolytes were repeated whenever required.

### RESULTS

**Table 1. AGE INCIDENCE**

| Age (years)  | Number of patients | Percentage of patients .(%) |
|--------------|--------------------|-----------------------------|
| 1-10         | 0                  | 0%                          |
| 11-20        | 1                  | 1.66%                       |
| 21-30        | 10                 | 16.66%                      |
| 31-40        | 22                 | 36.66%                      |
| 41-50        | 18                 | 30%                         |
| 51-60        | 6                  | 10%                         |
| >60          | 3                  | 5%                          |
| <b>Total</b> | <b>60</b>          | <b>100%</b>                 |

**Table 2. SEX INCIDENCE**

| Sex    | No. of patients | Percentage (%) |
|--------|-----------------|----------------|
| Male   | 21              | 35             |
| Female | 39              | 65             |

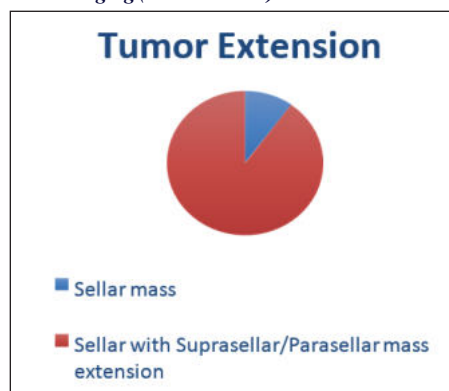
The age of the patients ranged from 15 years to 65 years in this study. The maximum incidence is in the 3rd decade (36.66%) followed by 4<sup>th</sup> decade (30%) decade of life. There were 35% males and 65% females in our study group.

**Table 3. CLINICAL FEATURES**

| Clinical features         | Number of Patients in present study | Percentage in present study (%) |
|---------------------------|-------------------------------------|---------------------------------|
| Headache                  | 46                                  | 76.66%                          |
| Vision disturbance        | 54                                  | 90%                             |
| Vomiting                  | 0                                   | 0%                              |
| Behavior disturbance      | 1                                   | 1.66%                           |
| Convulsions               | 1                                   | 1.66%                           |
| Heat & Cold intolerance   | 0                                   | 0%                              |
| Menstrual disturbances    | 1                                   | 1.66%                           |
| Acromegaly                | 5                                   | 8.33%                           |
| Cushingoid features       | 3                                   | 5%                              |
| Cranial nerve involvement | 1<br>(right side third nerve palsy) | 1.66%                           |

In the present study, vision disturbance present in 54 patients (90%) is the most common symptom followed by headache in 46 patients (76.66%)

#### Pre-operative imaging (CT/MRI Scan)



In the present study, 10% of the patients were having a mass in the sellar region, while 90% of the patient were having mass extending to the suprasellar and parasellar region.

**Table 3. COMPLICATIONS OF SURGERY**

| Complications                | Number of Patients in present study | Percentage in present study (%) |
|------------------------------|-------------------------------------|---------------------------------|
| Csf leak                     | 1                                   | 1.66%                           |
| Transient Diabetes Insipidus | 15                                  | 25%                             |
| Permanent Diabetes Insipidus | -                                   | -                               |
| SIADH                        | -                                   | -                               |
| Meningitis                   | -                                   | -                               |
| Vascular Injury              | -                                   | -                               |
| Cranial Nerve defect         | 1<br>(right side third nerve palsy) | 1.66%                           |
| Mortality                    | 0                                   | -                               |

In the present study, post operatively csf leak was seen in 1.66% of the patients. While the most common complication seen was transient diabetes insipidus (25%) which was resolved in few days in almost all of our patients. No mortality was seen in our study in any of the patients.

**Table 4. VISUAL OUTCOME AFTER SURGERY**

| Visual outcome | Number of Patients in present study | Percentage of patient in present study (%) |
|----------------|-------------------------------------|--------------------------------------------|
|----------------|-------------------------------------|--------------------------------------------|

|                 |    |      |
|-----------------|----|------|
| Vision improved | 54 | 100% |
| Worsened        | 0  | 0%   |

In our 54 patients having visual disturbances, all were improved after surgery.

## DISCUSSION

In the present study age, the patient were in the range from 15 years to 65 years. The maximum incidence was in the 3rd decade (36.66%) and 4th decade (30%). Pituitary tumors were uncommon in children with < 20 years of age with only one case present in the present study. In the study done by Dixit et al<sup>[19-28]</sup> (at Department of Neurosurgery NRS medical college, Kolkata), it was evident that most of the patient were in the 3<sup>rd</sup> decade of life. In the present study, there was a female preponderance seen. In case of Lal Rehman et al<sup>[5-12]</sup> study there was female preponderance, but in study of Donizete et al<sup>[13-18]</sup>, there was male preponderance. This is due to different geographical area and different sample size. In the present study, vision disturbance (90%) was the most common symptom followed by headache (76.66%). The studies done by Lal Rehman et al<sup>[5-12]</sup>, also have similar result like headache (87%) and vision problems (88.8%) were found in most of the patients with pituitary tumors. While the other features like convulsions was found in one patient only.

In the present study, the maximum patients were of non-functioning pituitary adenoma (70%) which was also present in Lal Rehman et al<sup>[5-12]</sup>, studies (81%). So among all pituitary adenoma NFPA were the most commonly found tumors in clinical practice as per the present study. This was followed by Prolactinoma (20%) and GH adenoma (5%) which were found in some of the patient, while TSH adenoma were not found in any of the patients.

In the present study, post operatively csf leak was seen in 1.66% of the patients. In Lal Rehman et al study it was (15.9%) and Dixit et al study (13.33%). While the most common complication seen was transient diabetes insipidus (25%), which was resolved in few days in almost all of our patients. No mortality was seen in our study in any of the patients. But in Dixit et al study, one patient had died due to intraventricular hemorrhage. In the present study, vision disturbances were seen in 54 patients, all of which had improvement in vision on regular follow up. While Lal Rehman et al study have visual improvement in 96.4% of the patients.

In the present study, all of the patients were discharged without any mortality. The mortality was 3.33% in Dixit et al study and 1.6% in Lal Rehman et al study.

## CONCLUSION

In the present study most common age group of patient affected by pituitary tumors were of 3rd decade followed by 4th decade. Females were more affected than male patients. Most common symptoms was visual disturbance in the form of decreased vision followed by headache. Endocrinological features were seen in the form of acromegaly and cushingoid features were seen in some of the patients. 2nd Cranial nerve was most commonly affected in the present study and on perimetry examination, Bitemporal Hemianopia was most common visual field defect which was seen in the patients who were having visual disturbance. In our study overall NFPA (70%) was more common than functioning pituitary adenoma. Among functioning pituitary adenomas, Prolactinoma (20%) followed by GH adenoma (5%) was found in most of our patients. MRI brain contrast with pituitary gland protocol is the gold standard investigation in pituitary tumor cases. CT PNS was done in all patients to evaluate the sinuses. Baseline hormonal profile and detail ophthalmic examination was done in all the patient pre operatively. Post operatively 15 patients (25%) were having transient diabetes insipidus and they were successfully treated. On follow up of patients, the relief from headache was seen in most of the patients and in all of our patients who were previously having visual disturbance, vision was improved after surgery.

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