

ENDOSCOPIC ENDONASAL TRANS-SPHENOIDAL SURGERY: OUR EXPERIENCE OF 40 PITUITARY ADENOMAS TREATED AT A TERTIARY CENTRE

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ABSTRACT

Introduction of Endoscope has revolutionized the surgical management of Pituitary tumors. Endoscopic endonasal approach has now become the most acceptable and routinely done procedure. In our tertiary center, we have analysed the data of 40 patients, who underwent endoscopic endonasal surgery over a period of one year. Clinical parameters, tumor excision, endocrinological status, complication rates were retrospectively analysed. One month follow up with repeat MRI and hormonal status was compared with pre-operative findings. There were 15 functioning and 25 non-functioning pituitary adenomas. There were 6 prolactinomas, 4 acromegaly, 4 Cushing and 1 FSH secreting pituitary adenoma. 25 were non-functioning adenomas. There was one microadenoma with Cushing syndrome. Subtotal excision was done in 76% of non-functioning and 66% of functioning adenomas. The remission rates were 80% in non-functional and almost 75% in functional pituitary adenoma. In our series, endoscopic approach proved to be less invasive, excellent tumors removal rate and better post-operative results. The complications were also less and comparable to other conventional methods. But it has steep learning curve and needs technical skills.

KEYWORDS

Endoscopic Endonasal Trans-sphenoid Surgery, Pituitary Adenoma, Diabetes Insipidus.

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INTRODUCTION

Pituitary surgery has evolved over the years and with the introduction of endoscope there was the drift from the conventional microscopic to less invasive endoscopic end nasal technique.^[1,2,3,4,5] But this technique demands for precise anatomical knowledge and technical skills. Though we have been doing endoscopic surgery for quite some time but this study has been done since last 1 year in our tertiary center with all modern instrumentation and neuro-navigation.

STUDY DESIGN

The study has been done on 40 patients between November 2014 to October 2015 which were operated in Mahatma Gandhi Medical College and Hospital, Jaipur (INDIA). We retrospectively analysed the clinical and surgical data of all the patients. Pure pituitary lesions including one craniopharyngioma with synchronous adenoma and one mucocoele were included in the study. Other sellar and suprasellar lesions including pure craniopharyngioma were excluded from the study.

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All the tumors were sent for immunohistochemical analysis. Endocrinological tests were performed at our center, which included Prolactin, IGF1, GH level with oral GTT and early morning cortisol value along with FT3, FT4, TSH and FSH and LH were done in almost all patients. Follow-up CT scan was done on 2nd postop day and at one month interval.

RADIOLOGICAL INVESTIGATION

All the patients had undergone Magnetic Resonance Imaging (MRI) with contrast.

CT PNS was also done in almost every patient for anatomy of sella, sphenoid sinus, septum and follow up MRI was done at 1-month interval.

SURGICAL TECHNIQUE

All the patients were operated by the same team of neurosurgeons under GA. Patients were placed in supine position with the head slightly flexed and tilted towards operating surgeon's side. The operating surgeon was positioned on right side along with first assistant. No ENT surgeon was required in any surgery. A telescope was placed in right nostril along with suction and left nostril was used for other instruments at different stages of the procedure. All procedures were performed by a bilateral approach with a zero degree rigid telescope was for nasal and sphenoid phase and a thirty degree telescope used during tumor removal from the parasellar and suprasellar regions. Intraoperative image guidance (Neuro-navigation) proved to be a useful tool in variable sphenoid anatomy. Adrenaline 1:10,000 soaked patties were placed in both the nostrils prior to painting and draping to decongest the nasal mucosa.

The telescope was navigated into the right nasal cavity, the choana reached and approx. 1.5 cm above choana the sphenoid ostium was identified. We usually lateralized the middle turbinate but in the majority of cases with a bulky middle turbinate, deviated nasal septum towards right side and in acromegaly patients with hypertrophied nasal mucosa, middle turbinectomy was performed to accommodate the telescope and acquire a better view. The sphenoid ostium was widened and then septum perforated and the opposite side ostium was reached and posterior nasal septectomy done. A microdebrider was used to excise soft tissues followed by Kerrison rongeurs and drill to widen the anterior phase of the sphenoid sinus.

A part of the rostrum was left in situ to indicate mid line. A Diamond burr was used to drill the sellar floor and intersphenoid septas and dura was exposed, which was incised in U shaped or cruciate fashion with knife and tumor was decompressed with zero degree telescope. Thirty degree and forty-five degree telescopes were used to inspect the cavity for any residual tumor. Sellar floor reconstruction was done when there was arachnoid tear using fat, fibrin blue and gel-foam. Vascularized mucosal flap was rarely required.

TUMORS CONTROL

The aim of surgery was to remove as much as tumor as possible without damaging the normal pituitary gland or arachnoid. Criteria for disease control were total tumor removal in non-functioning and hormonal control in functioning pituitary tumors. The success of surgery was based on surgeon's intraoperative vision and MRI with contrast done 1 month after surgery.

RESULTS

Over one year period 40 patients underwent endoscopic end nasal surgery. Male were 14 (35%) and females 16 (40%) of total patients. The mean age of patients was 40.51 years with range between 24–76 years. According to size 39 were macroadenomas (97.5%) and only one (2.5%) microadenoma. Localized perforation of sellar was seen in 16 (40%) patients and diffuse perforation seen in 22 (55%) patients and 2 (2%) patients had normal sella. Cystic component was found in 9 (22.5%) patients and intra-tumoral bleed in 4 (10%) patients. Headache and visual complaints were present in almost 34 (85%) patients, 2 (5%) patients had Cushing syndrome, one patient presented with amenorrhoea and other 2 with coarsening of features (Acromegaly). Three patients had history of sudden decrease in vision (Apoplexy) of which 2 improved gradually. Two patients had diplopia along with visual complaints and one patient of Cushing had altered consciousness which improved following surgery.

Among all patients 4 patients had significant tumor left due to significant suprasellar and parasellar extension and other 7 patients had less than subtotal excision (Less than 80% tumor removal). Among the 25 non-functional tumors 19 (76%) had subtotal excision and among functioning 6 (24%) had subtotal excision. All patients except one recovered well after surgery. One patient who expired was hypothyroid and there was arachnoid tear and CSF leak during surgery. Lumbar drain was placed immediately following surgery. Patient had severe headache on 3rd postop day and became unconscious and expired on 13th postop day.

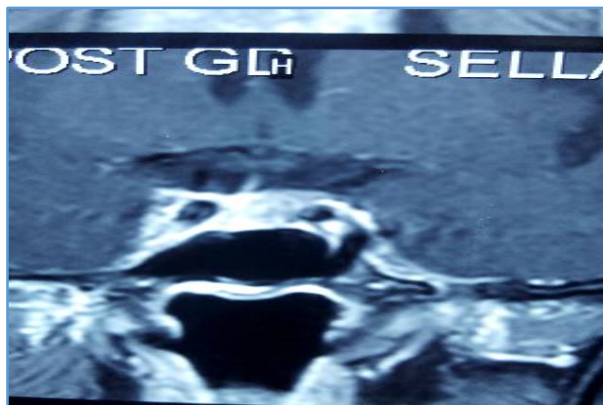
Meningitis was suspected to be the culprit. Out of rest of the, six patients had transient diabetes insipidus and required intranasal/oral Vasopressin spray and all of them improved. No patient in our study developed permanent diabetes insipidus.

One patient presented with delayed nasal bleed after 15 days of surgery and was re-explored and the bleeder from SER dura was coagulated. Among all patients the mean hospital stay was 5 days. The patients who required longer hospital stay were one with deep vein thrombosis, one with CSF leak, diabetes insipidus and one patient of Cushing's disease with altered sensorium, all were managed conservatively. Among all patients only two had undergone combined endoscopic and transcranial approach. Out of 4 patients of Cushing's, three underwent surgery and had complete resolution of symptoms and normalized cortisol levels and whereas one patient developed panhypopituitarism and was conservatively managed and recovered gradually. Among 6 prolactinomas, 5 improved clinically and chemically and only one patient required post-operative bromocriptine therapy. All 4 patients of acromegaly had significant improvement in hormonal and clinical symptoms.

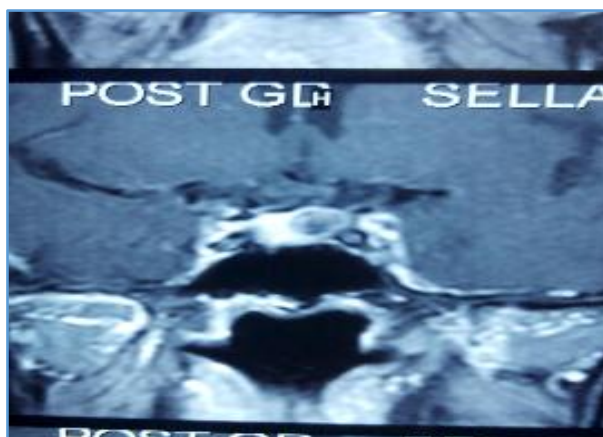
DISCUSSION

Microsurgical trans-sphenoid surgery for pituitary adenomas has been the standard treatment for decades.^[1,2,3,4,5] Among various techniques, Sublabial trans-septal and trans-nasal trans-septal approaches are the most commonly used.^[3,4,5,] Since the endoscope became popular in paranasal sinus surgery,^[6,7] it has increased the interest of neurosurgeons for its use in trans-sphenoid surgeries. In late nineties, a large series of endoscopic pituitary surgeries by Jho and Carrau,^{8,9} and Cappabeuca et al.¹⁰ increased the sudden interest in this technique worldwide. Jankowski et al.¹¹ first reported endoscopic endonasal resection of pituitary adenoma in 3 patients. A panoramic view inside the surgical area, close up of anatomy and an improved working angle were advantages of the endoscopic procedure. There were less nasal injuries due to speculum and decreased morbidity.^{12,13,14,15} The results of microscopic and endoscopic surgery for tumor resection and hormonal control is extensively compared.^[14,15] In our series most of the tumors were macroadenoma with mean tumor size 26±10.2mm with suprasellar and parasellar extension, which was larger than most of the series.^{15,16} This explains why our results were slightly inferior.

Dehdashti et al. reports gross total excision in 88% patients. Endoscopic surgical control of non-functioning adenomas varies from 62%-93%. According to Tabee et al.^[16] there is a 3 fold decrease in tumor removal with every 1cm increase in the tumor size (P=0.047). Our disease control results in functioning pituitary tumors (75%) are similar to previously presented series.^{14,15,16,17,18,19,20} Nasal complications in our series were less as compared to others. Transient diabetes insipidus was higher but there was no permanent diabetes insipidus or Syndrome of Inappropriate Antidiuretic Hormone secretion (SIADH).^{15,16,20,21} CSF leak and meningitis were also comparable.^{16,22,23} We had a higher mortality rate but death was not directly related to surgical procedure.



Postop Image of Pituitary Tumor



Preop Image of Pituitary Tumor

CONCLUSION

Endoscopic approach is minimally invasive and effective treatment for pituitary adenomas with less complications and a decreased hospital stay. Endoscope provides the view which cannot be obtained in tubular vision of operating microscope especially in parasellar and suprasellar extensions. Although the results of endoscopy and microscopy are comparable, there is a definitive inclination towards endoscopic surgery.

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Adenoma Characteristics	Number	%
Total Patients	40	100
Non-Functioning	25	62.5
Functioning	15	37.5
GH Secreting	4	10
Prolactinomas	6	15
ACTH Secreting	4	10
FSH/LH Secreting	1	2.5
TSH Secreting	0	0

Table 1: Characteristics of Tumor

Tumor Characteristics	Number	Percentage
Microadenoma	1	2.5
Macroadenoma	39	97.5
Suprasellar and Parasellar Extension	35	87.5
Localized Perforation of Sella	16	40
Diffuse perforation of Sella	22	55
Normal Sella	2	5
Cystic Component	9	22.5
Tumoral Bleed	4	10

Table 2: Tumor Characteristics

Presenting Symptoms	Number	Percentage
Headache and Visual Symptoms	34	85
Hormonal Symptoms		
Cushing Syndrome	2	5
Acromegaly	2	5
Amenorrhoea	1	2.5
Diplopia	2	5
Altered Sensorium	1	2.5
Sudden Visual Loss (Apoplexy)	3	7.5

Table 3: Clinical Symptoms

Surgery	Number	Percentage
Non-Functioning	25	62.5
Subtotal	19	76
Partial Resection	6	24
Functioning		
Subtotal	15	37.5
Partial Resection	10	66.67
Subtotal	5	33.33

Table 4: Surgical Aspects

Complication	Number	Percentage
SIADH	0	0
Transient	6	15
Permanent	0	0
Post Op Bleed	1	2.5
CSF Leak	2	5
Meningitis	1	2.5
Death (Following CSF leak and meningitis)	1	2.5
Seizures	0	0
ICA Injury	0	0
Panhypopituitarism	1	2.5
Deep Vein Thrombosis	1	2.5

Table 5: Complications