Endoscopic Endonasal Resection of Pituitary Adenoma: Analysis of 31 Cases

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Abstract:

Background: Endoscopic endonasal removal of pituitary adenoma is the first choice surgical procedure now a days. Rather than microscope, endoscope provides better magnification and illumination and gives very good outcome.

Objectives: The purpose of the study to find the benefits of endoscopic endonasal pituitary surgery.

Methods: We did 31 cases of pituitary adenoma surgery by endoscopic endonasal approach from January 2014 to December 2016.

Results: 31 cases underwent endoscopic endonasal transsphenoidal approach of pituitary adenoma. Residual tumor was seen in 5 cases postoperative follow-up MRI and CT scan. Visual improvement was satisfactory and hormonal improvement of functional adenoma was nice. Postoperative visual acuity and visual field was improved in 80% cases. There were 30% cases of temporary D.I which was controlled by medications. The average duration of follow-up was 18 months. Two patients were required re-exploration for incomplete removal which was done by under again endoscope. There were no cases of C.S.F. leak and no mortality.

Conclusion: In comparison to microscopic surgery, less complications and less hospital stay when we have done under endoscopic removal of pituitary adenoma. So endoscopic endonasal pituitary surgery now become a gold standard surgery for most of the pituitary adenoma because of its better advantages.

KeyWords: Pituitary, Endoscopic, Transsphenoidal,
otorhinolaryngologists, with the use of the endoscope in functional endoscopic sinus surgery, disclosing the pathway to the sella turcica and the endoscopic approach for resection of pituitary tumors either alone or as an adjunct to the microneurosurgery. Microscopic TSS can be performed via sublabial or endonasal transeptal approach. The latter has a slightly smaller field of view in comparison with the former, but it has the advantages of being less painful and not requiring postoperative packing. In the endoscopic technique, a rigid endoscope is used to get into the sphenoid sinus and the sella turcica through both nostrils. Some experienced neurosurgeons and otorhinolaryngologists have changed to the endoscopic surgery, claiming that this procedure is safer, less invasive, and allows a wider view of the sella turcica, improving tumor resection rates.

**Methods:**
Thirty one cases of pituitary adenoma surgery we had done by transsphenoidal removal of pituitary adenoma by endoscope from January 2014 to December 2016 in Bangabandhu Sheikh Mujib Medical University and some private hospitals. Selection of Patients depends on age, sex with tumor position and sizes. Post operative improvement of vision, and endocrine functions with morbidity of patients will be observed.

**Steps of Surgery:**
All 31 cases were done by endoscopic endonasal approach. The surgery was the done under general anesthesia.

**Position:**
- After intubation oropharynx is packed with ribbon gauze
- Supine with Head on horseshoe headrest / Headpin
- Bed turned so that feet are 30 degree to the patient left side in relation to head.
- Head is turn 5-10 degree toward the surgeon and Neck is tilted to the left side
- Head sufficient above the level of heart.

**Disinfection of the nasal cavities:**
Using a small killian-type nasal speculum, cotton pledgets soaked in 50% polyvidone-iodine along with diluted adrenalin are placed along the floor of the nasal cavities and in the space between the nasal septum and the turbinates, and they are allowed to take effect for approximately 5 minutes.

**Choice of the Nostril:**
We usually choose both the nostril. But under microscope through sublabial approach usually we used single nostril.

**Nasal Stage:**
During this stage, 0° telescope, 4mm in diameter was used. Once the telescope has been inserted into the chosen nostril, the inferior and middle turbinates, and the nasal septum were identified. With a tilleys forceps, long cotton pledgets, soaked in diluted adrenaline (1/10,000) or xylometazoline hydrochlorate, were inserted in the space between the middle turbinate and the nasal septum to achieve a vasoconstrictive effect particularly at the relevant, richly vascularized areas. After few minutes which was removed. The middle turbinate is gently lateralized or removed to make sure that the surgical pathway, that passes between the nasal septum and the turbinate itself is wide enough. The choana (Ch) is below and medial to the middle turbinate, and it can be followed superiorly along the sphenoid recess. (Figure 1-A,B,C,D). In microscopic procedure Hardy’s nasal speculum was inserted then we have see vomer of the sphenoid. Speculum itself retracted the turbinates and nasal septum.

**Sphenoid Stage:**
The sphenoid stage of the procedure begins with coagulation of the sphenoid recess. The target site of coagulation is located approx. 1 cm above the roof of the choana, or from the base of the middle turbinate up to the superior margin of the nasal cavity, there will be allowing for adequate inspection of the posterior portion of the nasal cavity, where the choana, the sphenoid recess and the sphenoid ostium are identified (Fig.2-A,B). After entering the sphenoid sinus and removing the mucosa we saw the sellar floor and important bony land mark of sellar floor (Figure 2-C). This stage almost same is in microscopic and endoscopic procedure.

(PS, planum sphenoidale; C, clivus; CP, carotid protuberance; OCR, opticocarotid recess; SF, sellar floor) asterisk, flattened sphenoid septum; double asterisk, tuberculum sellae; white dotted line: bone window
Sellar stage:
In this stage microscopic view is very limited and make it tunnel like vision but with endoscope we have seen wide angle vision. To free both of the surgeon’s hands and thus allow simultaneous use of two operating instruments during this stage of surgery, the $0^\circ$ telescope (4 mm in diameter and 18 cm in length) was held by assistant. The consistency of the sellar floor depends on the type of lesion present in the sellar cavity; it is nearly always intact in microadenomas, while it is frequently thinned-out and/or eroded in the case of pituitary macroadenomas. After removing the floor then dura was cut by ‘X’ or curve ‘C’ and tumor was coming out spontaneously and the sucking out whole of tumor. (Figure 3A,B,C)

Closure:
Haemostasis will be maintained with electrocautery and fibrillar. Gap will be packed by fat and fascia usually taken from thigh. Leak will be closed by fibrin glue if present then nasoseptal flap which was prepared starting of nasal stage. Then finally Merocel nasal packing was given.
Results:

31 patients was done by endoscopic endonasal operations from December 2014 to December 2016 in Bangabandhu Sheikh Mujib Medical University and some in private hospitals. Among them 17 cases were women and 14 were men (Table-1). Male female ratio was 1:1.21. Age ranges were from 24 to 58 years (median 34.5 years). Among 31 cases of pituitary adenoma there were 26 cases (84%) macroadenoma and 5 cases (16%) were microadenoma (Table-II). Functional adenoma were 11 cases (35%) which includes acromegaly 7 cases (64%) cushing 1 cases (9%) and prolactinoma 3 case (27%) and rest 20 cases (65%) of the tumor were nonfunctional adenoma.

Table-I

<table>
<thead>
<tr>
<th>Sex</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>14</td>
<td>45</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
<td>55</td>
</tr>
<tr>
<td>Total</td>
<td>31(N)</td>
<td>100</td>
</tr>
</tbody>
</table>

Table-II

<table>
<thead>
<tr>
<th>Pituitary Adenoma</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macroadenoma</td>
<td>26</td>
<td>85</td>
</tr>
<tr>
<td>Microadenoma</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>31(N)</td>
<td>100</td>
</tr>
</tbody>
</table>

The duration of follow-up was 18 months and one patient was required re-exploration to correct the visual deterioration in the immediate postoperative period. Typical chiasmal syndrome (bitemporal hemianopia) 17 cases (55%) or junctional syndrome (unilateral blindness and contralateral temporal field defect due to involvement of Von willebrand fibre of opposite optic nerve) - 12 cases (38%) Bil. Upper quadrentanopia 2 cases (7%). Visual outcome were assessed postoperatively. Visual improvement was satisfactory. Postoperative visual acuity and visual field was improved in 24 cases (77%) (Table-III). All patients with visual field and/or visual Acuity defect improved except two patients. Postoperatively, visual acuity was normal or improved in 77% of the eyes and the visual fields were normal or improved in 77%. (Table-III)

Endocrinological findings are hypocortisolism 6 cases, 11 cases hypothyroidism and hypogonadism 10 cases in Non functional adenoma. In Functional adenoma-- Acromegaly-7 cases Prolactinoma- 3 cases, Cushing syndrome- 1 cases are most commonest presentation. Postoperative anterior pituitary dysfunction improved in 17 cases (37%) out of 31 cases. There were 30% cases of temporary D.I. Regarding functional adenoma-all patients of Acromegaly, Cushing and Prolactinoma was improved. Among 31 cases underwent endoscopic transsphenoidal approach gross total removal were done in 24 cases, rest 7 case subtotal removal were done (Table-IV, Figure 4,5).
Residual tumour was seen in 16% cases in postoperative follow-up MRI scan.

Table-III
Shows prognosis following surgery (N-31)

<table>
<thead>
<tr>
<th>Post operative Visual Status</th>
<th>Number</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved</td>
<td>24</td>
<td>77</td>
</tr>
<tr>
<td>Not improved or static</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Deteriorate</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Normal</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>31(N)</td>
<td>100</td>
</tr>
</tbody>
</table>

Table-IV
Shows distribution of extent of tumour removal. (N-31)

<table>
<thead>
<tr>
<th>Extent of removal</th>
<th>Number of cases</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Total</td>
<td>24</td>
<td>77</td>
</tr>
<tr>
<td>Sub Total</td>
<td>06</td>
<td>20</td>
</tr>
<tr>
<td>Near Total</td>
<td>01</td>
<td>3</td>
</tr>
</tbody>
</table>

Two patients were required re-exploration for incomplete removal which was done. There were no cases of C.S.F. leak and no mortality.

Discussion:
Endoscopic management of pituitary adenoma offers, not only the advantage of improved visualization, but also magnification, and a panoramic perspective of the important relationships of the sella turcica. The disadvantages of endoscopic pituitary surgery when compared to microscopic surgery are that endoscopic images are two dimensional monitor generated. The clearness and sharpness of the endoscopic images are little reduced then microscopic images. Endoscopic video-images are still inferior to those of direct microscopic visualization. Digitally enhanced cameras have improved the picture quality to some degree. High-definition cameras and monitors will further improve the quality of endoscopic views. Another disadvantage is the learning curve for neurosurgeons who are already well trained in conventional microscopic surgery. Postoperative CSF leakage has been a major potential complication in transsphenoidal surgery. Occasionally it needs lumbar drainage, fluid therapy for its management. It may develop in early or late postoperative period. Meningitis, Hydrocephalous, Pneumocephalous are a sequel of C.S.F leak. Arterial bleeding, Venous bleeding, Subarachnoid haemorrhage are other potential complications. Regarding endocrine problem early diabetes incipidus is a common problem which was managed by injection pitresin or minirin (Desmopressin) nasal spray. Hypocortisolism, Hypothyroidism, Hypogonadism were common endocrine abnormality which were usefully managed by hormone replacement therapy. In a study of Tabae et al 2009, endoscopic pituitary surgery done on 821 patients where the overall mortality were 0.24%, permanent diabetic insipidus 1% and C.S.F. leak were 2%. In our study, we are having no mortality, few diabetic insipidus and no C.S.F. leak.

Conclusion:
Now a day’s endoscopic pituitary surgery remains the main line of treatment for pituitary adenoma. The panoramic exposure, magnification and flexibility of the endoscope combined with the absence of skin incisions, brain retraction and cranial nerve dissection, gives better outcome in endoscopic pituitary surgery. Endoscopic pituitary surgery now not a fashion but an ongoing demand from the patient side for its greater advantages, maximum tumour removal, less complications, less hospital stay and no scar.

References: