

ORIGINAL RESEARCH

Pituitary tumor- An experience of Endoscopic approach of transseptal transphenoid excision of pituitary.

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ABSTRACT

Background: Endoscopic surgery is performed through the sphenoid sinus to remove tumors from the pituitary gland and skull base. This minimally invasive surgery, Using endoscope camera and light to remove tumors gives magnified view and can reach near to the tumor. For Pituitary tumors type of surgical approach depends on the type of tumor, its exact location, its size, and whether it has spread into nearby structures. This study is done in a case series of 25 cases who underwent Endoscopic approach of transseptal transphenoid excision of pituitary. **Material and Methodology:** A retrospective review of case records of patients who had endoscopic endonasal transseptal transphenoid approach for pituitary tumors under general anesthesia were included. A total of 25 transphenoid surgeries were performed during this study period. This study was done in a tertiary care teaching hospital in department of ENT. IHEC approval was received before starting study. **Results:** The mean age of patients was 35 years (18-50 years). There were 14 females and 11 Males. 23 (92%) were macroadenoma (> 10 mm), and 2 (8%) were microadenoma (< 10 mm). Other than hormonal symptoms the most common presenting complaints included visual symptoms—changes in visual acuity or visual field deficits, headache, menstrual cycle disturbance or infertility/ impotence and acromegaly features. Subtotal resection could be done in 5 cases with residual tumor in the cavernous sinus. 7 patients had Intra op/Post op complications and were treated successfully. The common complications encountered were Nasal synechiae, cerebrospinal fluid leak, epistaxis, septal perforation. Average hospital stay was 5.2 days and average surgery time was 117 minutes. Close follow-up was maintained. The most common indications for longer hospitalization included prior co-morbid conditions which required extended monitoring or rehabilitation. **Conclusion:** At present the Transseptal -Transphenoid removal of pituitary tumor approach represents the standard approach by which the vast majority of pituitary adenomas are surgically resected. Endoscopic pituitary surgery is useful in all micro- and macro- pituitary adenomas including those with suprasellar and cavernous sinus extension.

Keywords: Transnasal, endoscopy; pituitary tumour; surgical technique, trans- sphenoid

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INTRODUCTION

Endoscopic surgery is performed through the sphenoid sinus to remove tumors from the pituitary gland and skull base. This minimally invasive surgery, Using endoscope camera and light to remove tumors gives magnified view and can reach near to the tumor. For Pituitary tumors type of surgical approach depends on the type of tumor, its exact location, its size, and whether it has spread into nearby structures

Signs of a pituitary adenoma often depend on whether the tumor is *functional* (making excess hormones) or *non-functional* (not making excess hormones). Functional adenomas can cause problems because of the hormones they release. Most of the time, a functional adenoma secrete more of a single pituitary hormone. These tumors are often found while they are still fairly small (microadenomas). Symptoms from

functional adenomas are based on which hormone they make.

Tumors that aren't making excess hormones (non-functional adenomas) often become large (macroadenomas) before they are noticed. These tumors don't cause symptoms until they press on nearby nerves, parts of the brain, or other parts of the pituitary. Non-functional adenomas that cause no symptoms are sometimes found because of an MRI or CT scan done for other reasons. These tumors are now being found more often as more MRI and CT scans of the brain are done. These might be the most common pituitary tumors. As long as they aren't causing problems, they're often just watched closely without needing treatment.¹

For larger or more complicated pituitary tumors, a craniotomy may be needed. In this approach the

surgeon operates through an opening in the front of the skull, off to one side. The surgeon has to work carefully beneath and between the lobes of the brain to reach the tumor. Craniotomy has a higher chance of brain injury and other side effects than trans-sphenoidal surgery for small lesions, but it's actually safer for large and complex lesions because the surgeon is better able to see and reach the tumor as well as nearby nerves and blood vessels.^{2,3} Microscopic transsphenoidal surgery has long been considered the "gold standard" in surgical treatment of pituitary tumors. The use of rigid endoscopes for sinus surgery provided the inspiration for their application to pituitary surgery⁴. In 1992 Jankowski provided the first description of fully endoscopic transnasal technique⁵. At the beginning, the endoscope was mostly used as a microscope-assisted tool to explore the sella cavity for residual tumor. In 1997, the first clinical series of purely endoscopic pituitary surgery was reported by Jho and Carrau. Jho has published relatively large series describing his experience with 44 pituitary adenomas and 6 other parasellar lesions⁶. Reports have suggested that in addition to providing more complete tumor removal, the endoscopic technique may also result in a lower incidence of complications related to blind dissection^{7,8}. Since then, many pituitary surgeons gradually shifted towards an endoscopic endonasal approach for pituitary adenomas and other parasellar tumors.

Trans-sphenoidal surgery is the most common way to remove pituitary tumors. Trans-sphenoidal means that the surgery is done through the sphenoid sinus. In the posterior superior part of the sinus lies the pituitary gland. The neurosurgeon makes a small incision (cut) along the nasal septum (the cartilage between the 2 sides of the nose) or under the upper lip (above the teeth). To reach the pituitary, the surgeon opens the bony walls of the sphenoid sinus with small surgical chisels, drills, or other instruments depending on the thickness of the bone and sinus. Small tools and a microscope are used to remove the tumor. Whereas the E.N.T Surgeon approaches using an endoscope. This way, the incision under the upper lip or along the nasal septum isn't needed, because the endoscope allows the surgeon to see through a small incision that's made in the back of the nasal septum.

The surgeon passes instruments through the nose and opens the sphenoid sinus to reach the pituitary gland

and take out the tumor. Whether this technique can be used depends on the tumor's position and the shape of the sphenoid sinus. Then bony openings are made in the nasal septum, sphenoid sinus, and sella to reach the pituitary. The trans-sphenoidal approach has many advantages. First, no part of the brain is touched during the surgery, so the chance of damaging the brain is very low. There may be fewer side effects, and there's also no visible scar. But this surgery may take longer, and it's hard to take out large tumors this way. Pituitary tumors can cause hormone problems and vision loss. Tumor removal often reverses vision problems and restores normal hormone balance. Team effort between neurosurgeons and ear, nose, and throat (ENT) surgeons give good results. This study is done in a case series of 25 cases who underwent Endoscopic approach of transseptal transphenoid excision of pituitary.

MATERIALS AND METHODS

A retrospective review of case records of patients who had endoscopic endonasal transeptal transsphenoidal approach for pituitary tumors under general anesthesia were included. A total of 25 transphenoidal surgeries were performed during this study period. This study was done in a tertiary care teaching hospital in department of ENT. IHEC approval was received before starting study.

Surgical Procedure

The operation takes place with the patient supine. The head of the bed is elevated and the patient's neck is slightly extended and rotated toward the nostril to be used for the procedure. Depending on the pre-operative assessment of the patient's nasal passage way a 4 mm endoscope is used. The video monitor is positioned behind the patient's shoulder directly opposite the surgeon's line of vision. The 0° endoscope is used to guide the intranasal dissection and initial tumor resection. Initially sphenoid ostia is identified and sphenoidotomy is done (inferomedially), sella turcica is identified, mucosa over sella is removed and sella bone is removed (using sickle knife/periosteal elevator/drill). Exposed dura mater is cauterized and cut in a cruciate manner. After taking tissue for histopathology, tumor resection is carried out using a suction device and ring curettes of varying diameter and orientation⁹.

Patient Positioning		Patient supine, head of the bed is elevated and the patient's neck is slightly extended and rotated toward the nostril to be used for the procedure.
A.	Nasal stage	Nasal Ethmoid / Turbinate stage
B.	Sphenoid stage	Ostium (identification)
		Sinus (opening)
C.	Sellar stage	Floor
		Duramater
		Lesion removal
		Exploration
D.	Reconstruction	

RESULTS

The mean age of patients was 35 years (18-50 years). There were 14 females and 11 Males. In our series, the peak age was fourth decade accounting for 17 patients. Endocrinal status was assessed and medical fitness for surgery was ascertained. Out of total 25 pituitary adenomas, 20 (80%) were hormonally active (functional), while 5 (20%) were non-functioning. Also 23 (92%) were macroadenoma (> 10 mm), and 2 (8%) were microadenoma (< 10 mm). Other than hormonal symptoms the most common presenting complaints included visual symptoms - changes in visual acuity or visual field deficits, headache, menstrual cycle disturbance or infertility/ impotence and acromegaly features.

Preoperative magnetic resonance (MR) imaging were obtained in all the patients, and CT scans were obtained in 23 (92%) patients. The exquisite definition of the bony boundaries of the sinus, provided by thin-sliced axial and coronal computerized tomography (CT) scans, was essential to assess the symmetry and aeration of the sphenoid sinus and to decipher the relationship of the sphenoid sinus septum to the sella turcica floor and carotid canals. The operation was performed under general anesthesia has been induced in the patient via orotracheal intubation. Intranasal packing was occasionally used and removed on the second post-operative day.

Subtotal resection could be done in 5 cases with residual tumor in the cavernous sinus. 7 patients had Intra op/Post op complications and were treated successfully. The common complications encountered were Nasal synechiae, cerebrospinal fluid leak, epistaxis, septal perforation. The CSF leaks were controlled by vascularized mucosal flaps which accelerates the healing process. Hadad nasoseptal flap, supplied by the posterior nasoseptal arteries which are branches of the posterior nasal artery was used in 01 case. There was no mortality in our series.

Average hospital stay was 5.2 days and average surgery time was 117 minutes. Close follow-up was maintained. The most common indications for longer hospitalization included prior co-morbid conditions which required extended monitoring or rehabilitation. Patient outcomes were determined from intra-operative assessment of tumor resection, postoperative hormonal levels and MR imaging results. MR imaging studies were performed for all patients during the early postoperative period, to be repeated after 6-12 months and then annually for the rest of their follow-up period.

DISCUSSION

Transsphenoidal surgery for pituitary adenoma has been the standard treatment for decades in the neurosurgical community. Jankowski *et al.* first reported the successful endonasal endoscopic resection of pituitary adenomas in three patients. They removed the middle turbinate to gain access to the sphenoid sinus. They performed the operation via one nostril in

two patients and via both nostrils in another⁵. Sethi and Pillay reported approximately 40 patients in whom they had performed endoscopic pituitary surgery via either the transnasal transeptal or ethmoidectomy approach with a sphenoid retractor¹⁰. The use of thin-sliced axial and coronal CT scans is essential to avoid unexpected findings from anatomical variations in the sphenoid sinus. Magnetic resonance imaging alone will not provide the necessary detail of bone anatomy of the sphenoid sinus.

In general, pituitary adenomas are diagnosed more frequently in women than in men probably because of the association of these tumors with menstrual irregularities¹¹ which correlates with our study. The incidence of pituitary adenoma increases with age, peaking between the third and sixth decades¹¹.

Pituitary adenoma can be divided into functioning and non-functioning tumors, or according to size namely microadenomas or macroadenomas. Functioning pituitary adenomas can be clinically classified by means of the hormone they secrete. These tumors become symptomatic because they secrete hormones like GH, ACTH and prolactin.

The incidence of residual tumor is higher in pituitary macroadenoma. This is probably due to size and extension of tumor to surrounding structures namely suprasellar extension to optic chiasm and lateral extension to engulf the internal carotid artery. Twenty eight percent of pituitary macroadenomas can extend into the cavernous sinus as reported in the literature¹². Complete removal in macroadenoma may be difficult without adequate decompression. Complications of endoscopic surgery of the paranasal sinuses can be classified according to the severity as minor or major and according to the time of appearance as immediate or delayed. Minor complications occur in between 2 and 21%¹³ of cases which include synechiae, crusts, minor bleeding, nasal septum perforation, headache, facial pain, alteration of dental sensitivity, edema, local infection, periorbital ecchymosis, palpebral edema, subcutaneous emphysema, stenosis of sinus ostia, hyposmia, epiphora, exacerbation of bronchial asthma, and postoperative sinusitis, this goes in coherence with our study.

The principal major complications anticipated are vascular injury and orbital and intracranial complications which vary from 1 to 3%. The most frequent immediate complications are CSF leak, intraoperative bleeding, orbital hematoma and injury to brain.¹⁴ Delayed complications include progressive loss of vision or smell, meningitis, bleeding, synechiae, and infection.

CONCLUSION

At present the Transseptal - Transsphenoidal removal of pituitary tumor approach represents the standard approach by which the vast majority of pituitary adenomas are surgically resected. Endoscopic pituitary surgery is useful in all micro- and macro-pituitary adenomas including those with suprasellar

and cavernous sinus extension.

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