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RESEARCH ARTICLE

ENDOSCOPIC TRANS-SPHENOIDAL APPROACH FOR PITUITARY SURGERY: RETROSPECTIVE AND PROSPECTIVE STUDY OF 70 PATIENTS

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ABSTRACT

Background: Endoscopic trans sphenoidal approach is increasingly used in the treatment of pituitary adenoma. It is considered approach of choice in pituitary tumor surgery. There are varying opinions about results of endoscopic approach in pituitary surgery. We therefore Retrospectively & prospectively studied the outcome of endoscopic Approach in Pituitary surgery.

Aim: To investigate the outcome of endoscopic Trans sphenoidal approach in patients with pituitary adenoma surgery.

Methods and Materials: A prospective study of 70 patients undergoing endoscopic Trans sphenoidal excision in our institution from July 2013 to December 2015 was carried out. Diagnosis of pituitary adenoma was done by preoperative computed tomographic scan and magnetic resonace imaging, visual field charting, hormone profile. The results of Pituitary surgery were determined by assessing clinical signs of visual acuity, post op Hormone profile, Visual field charting as well as by MRI / CT scans. Results such as extent of excision, rate of relapse in functioning adenoma, visual improvement, incidence of DI were compared with other studies done in past.

Results: Most common age group to be affected by pituitary tumors falls between 41-50 years of age.It is more common in Female 52% compared to Male 48%. Most common clinical symptoms in our series are Headaches followed by Visual disturbance. These symptoms of mass effect are much common than endocrinologic dysfunction of acromegaly and galactorrhea amenorrhea syndrome. Optic nerve involvement is other common clinical finding presenting in form of decreased vision or loss of vision, field defect or fundus changes. Commonest field defect is bitemporal hemianopia. Approximately half of the patients exhibited normal preoperative pituitary function in form of baseline hormone profile. Among 70 patients 37 were NFPA, 18 were GH adenoma, 2 were ACTH adenoma, 11 were prolactinoma and 2 patients with apoplexy. MRI is the diagnostic investigation of choice in pituitary tumors to define extent, invasion and relationship to major vessels and nerves. Total/near total removal was done in 63 patients and subtotal removal done in 7 patients. Adjuvant therapies were given in 8 patients. Two patients were given radiotherapy and 3 were given pharmacotherapy. The post operative complications were CSF leak 6%, Diabetes insipidus 21%. 59 patients had improvement in their symptoms including relief from headache, improvement in vision and endocrinal dysfunction. Post operatively visual functions improved in 35 patients and it remained stationary in 34 patients. Only one patient complained of worsening of his visual function and it was improved in follow up period.

Conclusion: The Pituitary constitutes a unique class of intracranial neoplasia. widespread use of MRI is now accepted as imaging procedure of choice in the evaluation of these tumors. Trans-Sphenoidal surgery is the primary treatment of choice for this class of tumors. Which can achieve superior extent of resection with acceptable rate of complication. Though long term follow up is needed for better understanding of the result.

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INTRODUCTION

Endoscopic Trans Sphenoidal approach is increasingly used in the surgery of pituitary tumours of various types now a days. Deep seated location of the Sella containing pituitary gland provide a difficult challenge to the operating neurosurgeon. Advances in the endoscopic technology and miniaturization of surgical instruments have expanded application of neuroendoscopy in skull base tumours. So, endoscopic trans sphenoidalapproach is considered the greatest in the management of pituitary surgery. Currently it is the first choice for pituitary surgery because of quality of endoscopic instruments and advances in imaging techniques it has yielded excellent results and can save large number of patients from morbidity of craniotomy.various studies have given their results of endoscopic approach for pituitary adenoma.

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MATERIALS AND METHODS

This study consists of 70 cases of sellar&suprasellar pituitary tumors treated in Neurosurgery department, B.J. Medical College & Civil Hospital, Ahmedabad from august 2012 to November 2015. These patients were direct admissions from the OPD of the department as well as those referred from the departments of medicine, neurology and ophthalmology.

Inclusion criteria

Allsellar & suprasellar pituitary tumors treated by transsphenoidal surgery.

Exclusion criteria

Conservatively treated sellar & suprasellar lesions. Cases operated by transcranial route. Sellar, parasellar or suprasellarmeningiomas, craniopharyngiomas or others were not included in the study. All patients were assessed clinically for: Visual symptoms (acuity, field of vision, colour vision and fundoscopy), endocrine signs and symptoms, headache and others. Preoperatively in all cases Perimetry, hormonal assays, x-ray skull (lateral) and C.T. scan/ MRI (brain and Sellar region) were done and repeated and reassessed accordingly in postoperative period and in follow up examination. Immediate postoperative outcome (course), complications, postoperative radiotherapy or medical therapy results were assessed. All patients were followed up for various period of time from 3 months to 2 years on out patient department or by correspondence. Observations were compared with results and findings of various studies.

RESULTS

A total of 70 patients who underwent trans sphenoidal endoscopic approach and excision of pituitaryexcision in our institution from Aug 2012 to Nov 2015 were incuded in our Retrospective & prospective analysis. Age, gender, clinical features, etiology, radiological features and surgical outcomes were considered for analysis. Theresultofthestudywas analysed byappropriate statisticaltool. The mean follow upperiod was 12.6 months. The results of the study areas follows. The age of the patient ranged from19yearsto72 yrs. Maximum number of patients were between 41 to 50 yrs.52 % were females & 48% males. There was slight female preponderance. Most common age group to be affected by pituitary tumors falls between 41-50 years of age. It is more common in Female 52% compared to Male 48%. Most common clinical symptoms in our series are Headaches followed by Visual disturbance. These symptoms of mass effect are much common than endocrinologic dysfunction of acromegaly and galactorrhea amenorrhea syndrome. Optic nerve involvement is other common clinical finding presenting in form of decreased vision or loss of vision, field defect or fundus changes. Commonest field defect is bitemporal hemianopia.

Table 1. Age incidence

Age(YR)	Percentage
11-20	3
21-30	21
31-40	24
41-50	33
51-60	14
61-70	3
71-80	2
TOTAL	100

Table 2. Clinical features

Clinical features	Percentage
Headache	71
Vision dist.	61
Vomiting	5
Menstrual dysfunction	11
Sexual dysfunction	5
Acromegaly	22
Cushingoid features	1

Table 3. Incidence of different tumours

Type of tumour		Percentage
Nonfunctioning	Nfpa	53
Functioning	Gh adenoma	26
	Tsh adenoma	0
	Acth adenoma	2
	Gonado.adenoma	0
	Prolactinoma	16
	Apoplexy	3
	Total	100

Table 4. Hormone assessment

Hormone profile	Percentage
Normal	56
Disturbed	44
Not known	0
Total	100

Table 5. Extent of tumour removal

Extent of tumour removal	Percentage
Total	70
Neartotal	20
Subtotal	10
	100

Table 6. Complications

		Percentage
Wound infection		0
Csf leak		6
Di	Transient	21
	Permanent	0
Meningitis		0
Vascular/hypo. Injury		0
Mortality		0
Vision deterioration		2

Table 7. Outcome and follow up

	Percentage
Discharged	92
Discharged + rt	3
Discharged + pharmacotherapy	5
Death	0
Total	100

Table 8. Visual outcome

	N	Percentage
Improved	35	50
Stationary	34	48
Worsened	1	2
Total	70	100

Table 9. Remission according to tumor type

Tumor	N	Remission	%
Gh adenoma	18	17	95
Tsh adenoma	0	0	0
Acth adenoma	2	2	100
Gonado.adenoma	0	0	0
Prolactinoma	11	10	91

Table 10. Clinical presentation as compared to other series

	Mass effect	Endocrinopathy
Presentseries	71%	34%
Thaper *et al*	73%	86%
Thomas *et al*	86%	56%
Ashish suri *et al*	79.7%	17.7%
K h ho *et al*	78%	42%

Table 11. Visual outcomes compared to other series

Series	Improved (%)	Stationary (%)	Worsened (%)
Presentseries	50	48	2
Shone *et al*	46	17	4
Salmi *et al*	70	17	12
Ebersold *et al*	74	21	4
Bevan *et al*	61	12	0
Marazuela *et al*	33	43	0

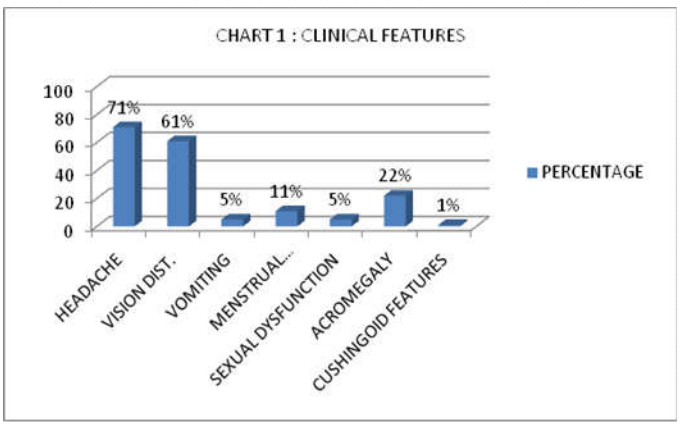
Table 12. Remission compared to other series

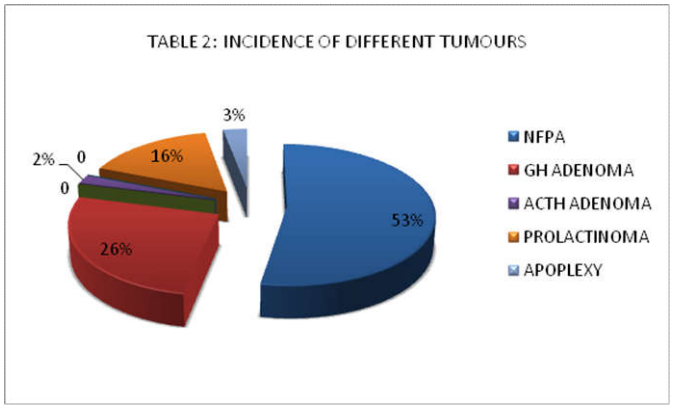
Tumor	Present series	Amin kassam *et al*	Ivan kruljac *et al*
Gh adenoma	95	92	71.4
Tsh adenoma	0	0	0
Acth adenoma	100	100	100
Gonado.adenoma	0	0	0
Prolactinoma	91	60	90.2
Total	95	85	84.9

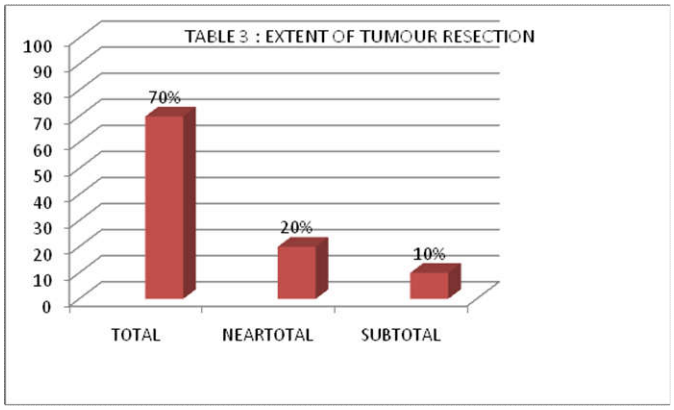
Table 13. Complications compared to other series

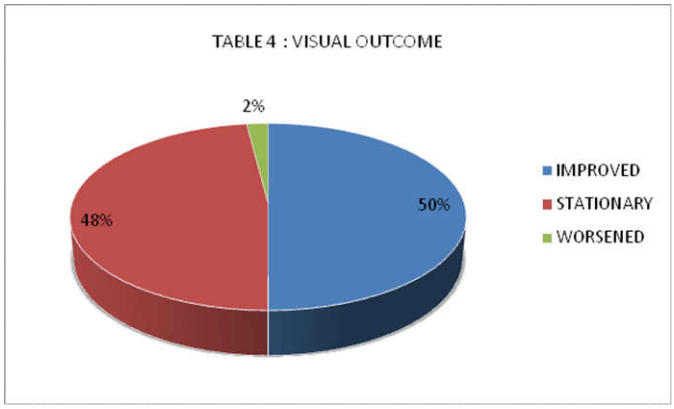
Series	Csf leak (%)	Infection/ meningitis (%)	Di (%)	Visual deterioration (%)	Mortality (%)
Our series	6	0	21	1	0
Guiot & derome *et al*	1.3	0.5			1.4
Wilson & dempsey *et al*	6.4	2		1.2	0
Law *et al*	1.5	0.6		0.5	0.5
Pietro mortini *et al*	0.3	0.1		1	0.3
Xue-fei shou *et al*	3.8	0.6	1.5	0.87	0.35

Approximately half of the patients exhibited normal preoperative pituitary function in form of baseline hormone profile. Among 70 patients 37 were NFPA, 18 were GH adenoma, 2 were ACTH adenoma, 11 were prolactinoma and 2 patients with apoplexy. MRI is the diagnostic investigation of choice in pituitary tumors to define extent, invasion and relationship to major vessels and nerves. Total/near total removal was done in 63 patients and subtotal removal done in 7 patients.









Adjuvant therapies were given in 8 patients. Two patients were given radiotherapy and 3 were given pharmacotherapy. Thepost operative complications were CSF leak 6%, Diabetes insipidus 21% .59 patients had improvement in their symptoms including relief from headache, improvement in vision and endocrinal dysfunction. Post operatively visual functions improved in 35 patients and it remained stationary in 34 patients. Only one patient complained of worsening of his visual function and it was improved in follow up period.

DISCUSSION

The age range in present study was from 19 to 72 years. The majority of patients were in the 4th to 6th decade of their life. Similar age distribution pattern were seen in series by Minderman *et al* who found peak incidence between fourth to sixth decade of life. Sex incidence shows female preponderance in our series (M: F- 1:1.3). Similar sex incidence ratios shown in kazumora *et al* (M: F- 3:4) series of 42 patients. As it is a random study sometimes correlation can not established. Major complain of patients was Headache (50/70) followed by Visual disturbance (43/70). Vomiting,

behavioral change, altered sensorium were among the other complain. Eight patients were presented with clinical syndrome of amenorrhea and galactorrhea while sixteen patients presented with acromegaloid features. In series by thaper *et al*. 73% patients presented with mass effect and 86% had endocrinopathy. Many of the patients had presented with signs/symptoms of both mass effect and endocrinopathy and was due to propensity of these tumors to cause multisystem dysfunction and variable combination of mass effect and endocrinal dysfunction. 53% of tumors of pituitary gland in our study were nonfunctioning followed by GH secreting adenoma 18/70 (26%) followed by prolactinoma 11/70(16%). Robert y. osmura *et al* had presented study of 328 cases of pituitary adenomas and have found non functioning adenomas as most common type (31.5%) followed by GH and prolactin producing adenomas. These diagnoses were further confirmed by immunohistochemistry and ultrastructural features in their series. Erfourth *et al*, demonstrated that amongst a cohort of 328 patients of pituitary tumor, 78.8% were non functioning, 21% prolactinomas and remaining others. In study by Zarger *et al*, gonadotrophic adenoma was most common 44/75 followed by non functioning adenoma 12/75. Prolactinomas constituted 11/75 (14.66%) in that series. Pietro *et al* had presented a series of 1140 cases of pituitary adenoma undergoing transsphenoidal surgery, most common tumor type NFPA(33.2%), followed by GH adenoma (28.1%), ACTH adenoma (23%) and prolactinoma (13.2%). In past years, MRI has become the procedure of choice in diagnosis of pituitary tumors. While CT scans shows pituitary adenomas as low density lesion in pituitary gland/sellar region. An MRI picture of pituitary differs in different intensity modes. It is of intermediate intensity on T1 weighted image which enhances intensively on gadolinium contrast and hyperintense of T2 weighted image. Although both the normal pituitary gland and the microadenoma are perfused therefore enhance with paramagnetic contrast agents, they are not perfused initially to the same degree. Therefore, on immediate postinjection images (0 to 10 min after injection), the relative hypointensity of the microadenoma compared to the normal gland is increased. If delayed images are obtained, the contrast agent appears to slowly permeate into the lesion. The adenoma may then be hyperintense to the pituitary gland. Multiplanar display of parasellar structures in relation with tumors shows more with MRI. In our series we perform CT and MRI in all cases, MRI is the investigation of choice for these tumors, showing extra sellar extension, mass effects and CT for erosion.

Lundin p *et al* in a series diagnosed these tumors solely on MRI basis in 72%. The patients in our study were subjected to surgery as the first and in many cases the only line of definitive treatment. Total/ near total excision of tumors was done in 70% while in remaining 10% a subtotal excision could be done. On analyzing the data subtotal excision was done due to extensive parasellar and suprasellar extension of tumor and the adherence of same to vital neurovascular structures. In study of Xue-feiShou *et al* total resection was done in 84.5% and subtotal/partial resection done in 15.5%. In study of Amin b Kassam the figure was 93% for total resection and 7% for subtotal resection. We included only the cases operated through the transsphenoidal route in our study and this is the preferred treatment now a day if not contraindicated. Thomson *et al* in a series of 104 cases of pituitary adenomas used the transnasaltranssphenoidal route in 84 of patients, while various other transcranial approaches in remaining 20. Similar preference to transnasal routes is preferred by Tyrrnel J Blake *et al*, Sethi DS *et al* and Shiman *et al*. It can be said surgeon's personal preference and experience, availability of infrastructure and tumor extension into neighbouring areas dictates the choice of surgical procedure with more and more surgeons favouring endoscopic transsphenoidal techniques if not contraindicated. 70% show improvement in visual function in Salmi *et al* series. 46% of patients in series by Shone *et al* had visual improvement following surgery. The figures were 50% in our series and were in form of increased visual acuity and improvement of field vision as compared to pre operative status. Visual acuity was decreased in 1 patient postoperatively which improved in follow up examination. Visual acuity was improved in totally/near totally resected group and remains stationary/worsened mainly in subtotal/neartotal resection group. Visual outcomes shown are of immediate postoperative period and initial follow up. We require long follow up for more encouraging results.

Overall postoperative remission in our series was achieved in 95% of patients: 95% with GH adenoma and 100% with ACTH adenoma, & 91% for Prolactinoma. Tumor size significantly influence surgical outcome. Patients diagnosed with microadenoma had greater chance for remission after surgery. Tumor type did not significantly influence surgical outcome. We had 0% mortality and 21% morbidity in our series. Series by Thaper *et al* report mortality rate of 15 and morbidity of 15% while another study by Zervas *et al* reports mortality rate of 0.5% and morbidity of 2.20%. Morbidity was in form of CSF leaks, diabetes insipidus, wound infection etc. DI occurs in 21% of cases which is usually transient in nature. This occurs mainly in the patients in which total/neartotal removal of tumor was done. This may simply reflect the extreme sensitivity of the hypothalamic-neurohypophyseal unit to local alterations in blood flow, edema, and traction on the pituitary stalk. Permanent disturbance of antidiuretic hormone (ADH) secretion is due to direct damage to the neurohypophyseal unit and depends much more on the original size and location of the tumor and the extent of surgical resection. Postoperative CSF leak was seen in 6% of cases, which can be managed by conservative means like lumbar drain. Reexploration required in cases not heals by conservative means. Postoperative CSF leak can be avoided not only by careful surgical technique, but also by the use of lumbar drain for diversion of CSF that helps the cisternal repairing of small CSF leak. Lumbar drain should be kept for minimum duration because it can lead to meningitis by infection due to skin bacteria.

Visual deterioration occurs in 1 patient in our series but it was transient and improved in follow up period. Damage to optic nerves and chiasm can also occur from direct surgical damage, hemorrhage or ischemia. Many patients have preoperative compromise of visual function, making them more vulnerable to further damage. As in our patient vision was already compromised due to apoplexy. Difference in percentage of complications might be due to small sample size in our series.

With development of neuroimaging techniques and neuroanaesthesia, along with modern biochemical investigative facilities, aided by newer drugs in management of pituitary cases, overall prognosis of these tumors has became very favourable. Modern microneurosurgery has made the life more comfortable for patients and surgeon alike. No definitive genetic predisposition or aggravating factors in causation of pituitary tumors are established and because nor any preventive solution exist, surgery remains mainstay for

neurologically compromised patients and this is well established by available literature and present studies.

Conclusion

The Pituitary constitutes a unique class of neoplasia that in concept and in practice differs fundamentally from other tumors of intracranial origin. The most important difference is related to the double edged clinical problem posed by these tumors characterized by endocrine concern and complicated by the oncological issues. The diagnosis of these tumors is generally uncomplicated because of their unique clinical presentation involving visual apparatus and pituitary-hypothalamic axis.widespread use of MRI is now accepted as imaging procedure of choice in the evaluation of these tumors. Trans-Sphenoidal surgery is the primary treatment of choice for this class of tumors. The surgical objectives involve the elimination of mass effect, preservation and restoration of pituitary functions. Although gross total removal remains an intuitive and frequently achievable surgical goal for many tumors and should be attempted in the extent that it is safely possible it is neither a realistic expectation nor an absolute necessity. The aggressive surgical resection undertaken when attempting cure must be balanced by understanding the potential surgical morbidity. Preservation of function of pituitary stalk, optic apparatus and hypothalamus is essential in attaining desirable postoperative result. Subtotal resected tumors should be considered adjuvant therapy (Radiotherapy or Pharmacotherapy) on case-by-case basis. Careful follow up and optimization of pituitary hormone is important in long-term survival of the patients of pituitary tumors.

REFERENCES

Amin b Kassam, Paul a Gardner, Carl h Synderman, outcomes following purely endoscopic, endonasal resection of pituitary adenoma. *Thieme E- Journal skull base,* 2006, 16-A055.

AU Zarger AH, lanway BA, Masoodi SR, Salandhim, Ganie MA, Bhat MH. Wani AL, Bashirm, clinical and endocrine aspects of pituitary tumour. *Saudi Medical Journal* 25-10:1428-32.2004 Oct

bevan JS, Adams CB ,Burkey CW, Morton KE, Molyneux AJ, Moore RA, Esiri MM; Facters in the outcome of transsphenoidal surgery for prolactinoma and non functioning pituitary tumour, including pre operativebromocriptine therapy. ClinEndocrinol 26:5415-5456,1987.

Ebersold MJ, Quast LM, Laws ER jr, Scheithauer B, Randall RV: Long term results in transsphenoidal removal of non-functioning pituitary adenomas. *J Neurosurg*., 64:713-719,1986.

Erfurth AU., EM, Bulow B, Mikoczy, Haghmar-Incidence of second tumour in hypopitutary patients*, Journal of Clinical Endocrinology and Metabolism,* 86-2:659-62, 2001 Feb

Guiot G, Derome P: Surgical problems of pituitary adenomas, in krayenbuhl H (ed): Advances and Technical Standards in Neurosurgery .Wien, springer velag, 1976, pp 3-33,

Ivan Kruljac, Andreja Maric, Vatroslav Cerina, Hrvoje Ivan Pecina. *Outcomes of PEETS cmj*. 2012, 53, 224-231

Laws ER Jr: complications of transsphenoidal microsurgery for pituitary adenomas, in Brock M (ed): Modern Neurosurgery. Berlin, Springer Vela, 1982, vol 1, pp.181-186

Ludin P, Pedersen F: Volume of Pitutarymacroadenomas : Assement by MRI J>Comput. Assist. Tomogr. 16 : 519-528, page 50, 3rd para.1992.

Marazuela M, Astigarragr B, Vicente A, Estrada J, Cuerda C, Garsia-uria J, Lucas T: recovery of visual and endocrine function following transsphenoidal surgery of large nonfunctioning pituitary adenomas, *J Endocrinol Invest*, 17-703-703, 1994.

PietroMortini, Macro Losa, Raffaella Barzaghitranssphenoidal surgery in a large series neurosurgery online vol. 56, 1222-1233, 2005.

Robert Y. Osamura, HanakoKajiya, Mao Takei, Noborn Egashira, Maya Tobita, Susuma. Toketshu, and akira Teramota. Pathology of Pitutary tumours. *Histochemical Cell Biology*, 2008, September 130 (3) : 495-507

Salmi J, Grahne B, Valtonane S, Pelkonen R:Recurrence of chromophobe pituitary adenomas after operation and post operativeradiotherapy.*ActaneurolScand*., 66:681-689, 1982

Sethi DS.Pillay PK. Endoscopic management of lesions of sellaturcica. *J LaryngoOto*., 1995, Oct 109 (10) : 956-962.

Shimon, Flan, Ram, Zvi R, Hadani, Moshe. Transsphenoidal surgery for Cushing's disease: Endocrinological Follow up Monitering of 82 patients.

Shone GR, Richards GH, Hourihan MD, Hall R, Thomas JP, Scanlon MF-Non secretory adenomas of the pituitary treated by trans-ethmoidalsellotomy. *J R Soc Med*., 84:140-143, 1991.

Tyrell J. Blake, Lamborn, Kathleen R. Hananegan, Lisa T RN Applebury, Carol B Wilson, Charles B. Transsphenoidal Microsurgical Therapy of Pitutary tumours. *Neurosurgery,* 1999; Volume 44, Number 2: p.254.

Wilson CB, Dempsey LC-Trans-sphenoidal microsurgical removal of 250 pituitary adenomas. *J Neurosurg*., 48;13-22,1978

Xue- feiShou, Shi-qi Li, Yong- fei Wang, treatment of pituitary adenoma with a transsphenoidal approach, neurosurgery online Vol. 56 249-256, 2005.

Zervas NT, Candidia GL, Black PMCL, Incidence and Management of Complications in Surgery of Pitutary adenomas. *Neurosurgery,* 1987; 20 (6) : 920-924.

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