

INFLUENCE ON VISUAL DEFICIT AFTER TRANSSPHENOIDAL HYPOPHYSECTOMY FOR PITUITARY ADENOMAS

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ABSTRACT

Background: Transsphenoidal surgical excision of pituitary tumor in widely used route. **Objective:** To determine the effects on visual symptoms after transsphenoidal hypophysectomy for pituitary adenomas. **Patients & Methods:** This retrospective study was conducted in the department of neurosurgery, Postgraduate Medical Institute, Lady Reading Hospital, Peshawar. All patients from January 2006 to January 2011, who underwent transsphenoidal surgery for pituitary adenomas, were included for visual deterioration. **Results:** During the five years time a total of 65 patients were operated for transsphenoidal adenomas. Four patients were excluded due to various reasons. There were 44 (72.13%) male and 17 (27.87%) female patients. The age ranged from 31 years to 62 years. The mean age was 44 years. There was improvement in visual symptoms in 39 (63.93%) patients immediately after surgery, 13 (21.31%) patients showed improvement in four weeks time, while there was no improvement in 9 (14.75%) patients. **Conclusion:** The improvement in visual symptoms occurs in majority of the patients after transsphenoidal hypophysectomy. There are several factors which influence the outcome, like duration and size of the lesion.

Key words: Transsphenoidal Hypophysectomy, Pituitary Adenoma, Visual Outcome.

INTRODUCTION

Transsphenoidal route is widely considered for surgical excision of pituitary tumors which are restricted to intrasellar area and sphenoid sinus or slight suprasellar. It is a safe and effective route with extremely good outcome and procedure of choice for removal of intrasellar lesions.^{1,2,3} Mostly the presenting symptoms of these tumors are visual deterioration, neuroendocrine or raised intracranial pressure.² Different visual symptoms are known, including deterioration of visual acuity, visual field defects, oculomotor symptoms.^{1,3} Visual field defects are quite variable ranging from complete blindness and no perception of light to unocular or binocular small scotoma, quadrantomas and bitemporal hemianopia (very common to these tumors). Vision may be completely normal in small tumors which do not compress the visual apparatus.³ Complete blindness may be in one eye or both, may be acute or chronic. Blindness usually occurs due to optic nerve atrophy by progressive tumor compression in chronic or delayed cases of blindness, these may be irreversible.⁵ Sometimes there may be sudden bleed inside the tumor (called

pituitary apoplexy) and leads to severe headache, episode of acute blindness or visual deterioration and other endocrinal symptoms like adrenal insufficiency.⁴

Different pituitary tumors with visual symptoms present in this area, may be secretory (Functional) or non-secretory (non-functioning).² Growth hormone secretory adenomas and prolactinomas are the commonest among the secretory tumors. Surgical treatment is required for most of these for the relief of visual symptoms and prevention of further deterioration.⁴

The objective of this study is to determine the transsphenoidal surgery outcome in terms of visual symptoms improvement and the different factors which may influence the visual outcome.

PATIENTS AND METHODS

This retrospective study was conducted in the department of neurosurgery, Postgraduate Medical Institute, Lady Reading Hospital, Peshawar. All patients from January 2006 to January 2011, who underwent endonasal transsphenoidal surgery for pituitary adenomas, were included for visual deterioration. Four out of 65 patients were excluded due to redo transsphenoidal surgery and insufficient pre or post operative ophthalmological data. All patients with primary ocular disease, previous ocular surgery and systemic disorders other than pituitary adenoma that could affect visual function were excluded.

Patient's record was addressed retrospectively and data regarding age, sex, visual symptoms, detailed visual assessment by ophthalmologist (perimetry, visual acuity, fundoscopy) other presenting

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symptoms, pituitary hormonal assays, duration of symptoms, CT/MR findings was collected. Visual acuity was measured during post operative hospital stay and follow up after 10 days and 3, 6, and 12 months. Goldman perimetry, Snellen chart, ophthalmoscopic funduscopy and slit lamp examination techniques was used for this purpose. Data analysis was performed through SPSS version 10.0. Frequencies and percentages were computed for categorical variables like age, sex, MRI CT findings, preoperative findings, visual preoperative and postoperative findings and improvement, and endocrinal assays.

RESULTS

A total of 61 patients, operated (Endonasal transsphenoidal surgery) for pituitary adenoma during 5 years duration between January 2006 and January 2011 were included in this study. There were 44 male and 17 female patients. Male to female ratio was 2.58:1. The ages ranged from 31 to 62 years. 31 (50.08%) were in 3rd decade of their life. 18 (29.50%) in 4th, and 12 (19.67%) in 5th decade of age. Only one patient was older than 60 years. Redo transsphenoidal surgery was performed in 3 cases. Sellar packing was done in 10 cases with fat ball taken from anterior abdominal wall to prevent CSF leak. Radical or gross total resection was done in 45 (73.77) cases, CSF diversion with VP shunt was required in 3 cases.

The main presenting symptoms were progressive visual decline, endocrine dysfunctions and symptoms of raised intracranial pressure. All of the 61 patients had visual decline variably. 35 of these patients were referred from different ophthalmology units, 23 admitted through OPD, 3 admitted through emergency with symptoms of severe headache and vomiting and sudden visual loss, diagnosed as pituitary apoplexy. Visual acuity was measured by Snellen chart and post operative visual acuity was noted after 2 days, and follow up 10 days, 6 months and 12 months in OPD and private clinics. 25 (40.98%) patients out of 61, and 55 eyes out of 122, presented with visual acuity between 6/6 and 6/12, out of these 17 (27.86%) had partial improvement, 7 improved to normal and one had no improvement. 10 (16.39%) patients and 25 eyes out of 122, presented with visual acuity between 6/12 and 6/24. 8 (13.11%) had partial improvement and 2

had no improvement. Whereas, 8 (13.11%) patients and 15 eyes out of 122, presented with visual acuity between 6/24 and 6/60, 3 improved to normal and 5 had partial improvement, 13.11% total improvement. While 8 (13.11%) patients and 12 eyes of 122, presented with visual acuity from 6/60 and counting finger (CF). Out of these, 3 patients had improved to normal and 4 had partial improvement, total 11.47% had total improvement. A total of 5 patients presented between CF and hand movement (HM) and had 4.91% improvement in visual acuity. Total 5 patients presented with no perception of light and complete blindness, 2 (3.27%) of these had partial improvement over time. Thus there was total or partial improvement in 52 (85.24%) patients in term of visual acuity as shown in detail in table I.

33 (54.09%) out of the total 61 patients had bitemporal hemianopia, 10 (16.39%) had single quadrantopia in temporal fields, 7 (11.47%) had two quadrants temporal field defects and the same number had three quadrants visual field defects, while 4 (6.55%) were totally blind. Visual field improved in 74% of cases with different pattern of defects. 64% improved partially while 10% had complete improvement, and 26% had no improvement in visual field as shown in table II. One blind patient had partial improvement in his field of vision.

Fundoscopy done pre operatively showed normal optic discs in 48 patients, papilledema in 4 patients with pending hydrocephalus, and optic atrophy in 9 patients. Those patients with neuroendocrine abnormality presented with complaints like weight loss, stunted growth, hypothyroidism, Diabetes insipidus in 8 (13.11%) patients. Headache was present in 47 (77.04%) patients.

33 (54.09%) of the tumors were non secretory. Others were having increased amount of various hormones secretion, Prolactin 18 (29.50%), Growth hormone 6 (9.83%), Corticotroph secreting adenomas 3 (4.91%), and TSH secreting adenoma 1 (1.63%).

Factors affecting the visual outcome observed in our study included age, sex, duration of visual decline, duration of blindness, presence of hypothalamic symptoms, pituitary apoplexy, imaging characteristics of sellar/suprasellar/parasellar extensions, operative findings regarding consistency of tumor, necrosis, hemorrhage in the tumor, extent of surgical resection of the tumor, and histopathological results of the biopsy.

Younger age, male sex, short duration of symptoms, small tumors without suprasellar/parasellar extensions, pituitary apoplexy and hemorrhage findings during operation were some favorable variables noted in our study for better outcome and improvement of visual defects.

Table: I
Effects on visual acuity of transsphenoidal surgery

Visual Acuity	Patients	Eyes effected	Improved to normal	Partial improvement	No improvement	Total improvement
6/6-6/12	25	55 (45.08%)	7	17	1	24 (39.34%)
6/12-6/24	10	25 (20.49%)	0	8	2	8 (13.11%)
6/24-6/60	8	15 (12.29%)	3	5	0	8 (13.11%)
6/60-CF	8	12 (9.83%)	3	4	1	7 (11.47%)
CF-HM	5	7 (5.73%)	0	3	2	3 (4.91%)
NPL	5	8 (6.55%)	0	2	3	2 (3.27%)
Total	61	122 (100%)	13	39	9	52 (85.24%)

Table: II
Effects on visual field after transsphenoidal surgery

Visual field	No of eyes	%age	Improved to normal	Partial improvement	No improvement
BTH	33	54.09%	3	28	2
Upper quadrant TFD	10	16.39%	2	5	3
Two quadrant TFD	7	11.47%	0	2	5
Three quadrants	7	11.47%	1	3	3
Blind	4	6.55%	0	1	3
Total	61	100%	6 (9.83%)	39 (63.93%)	16 (26.22%)

DISCUSSION

Pituitary adenomas are frequently been treated by transsphenoidal endonasal route.^{2,3,6} Gross total or near total resection of the lesion is the goal of surgery. There can be secondary visual deterioration after transsphenoidal surgery in rare occasion.^{7,8} But this rate must be less than 2% as compared to the 70-80% visual improvement over variable duration of time.⁹

Pituitary adenomas are benign slow growing tumors which arise from the anterior pituitary cells. They may be secretary or non secretary.² They can present with systemic endocrine symptoms or local compression of different adjacent structures like visual apparatus, cranial

nerves, CSF pathway and so on. Optic chiasma and optic nerves and optic tract are in close proximity of the sella turcica and these tumors.^{2,3} Nasal fibers of the optic nerves cross in the optic chiasma and join the temporal fibers of the opposite side to form the optic tract. Compression of the optic chiasma is common and leads to bitemporal visual field defects/hemianopia. Because of the irregular and variable growth of the tumors the visual compromise and deficit is usually asymmetrical in both eyes.

Pituitary tumors present with progressive visual deficits as the tumor enlarges. Usually it causes visual field defects, identified by different methods of perimetry. Commonly the temporal fields are affected symmetrical or asymmetrically. It may also cause color vision abnormality, diplopia, ophthalmoplegia and 3rd or 6th nerves palsies. Visual fields defect has been reported in up to 90% of the patients before 1970.¹⁰ In most of the patients the visual field defects are the presenting symptom. Optic atrophy is commonly found in chronic cases with chiasmal compression. This happens due to secondary retrograde degeneration of axons.^{2,3} It was present in about 13% of patients in this group with prolonged symptoms and visual acuity up to no perception of light (PL) and hand movements (HM). This is the group of patients which will have poor visual outcome depending upon the duration of onset of visual field defects. The visual outcome after transsphenoidal surgery is excellent. Even severe visual defects due to optic apparatus compression can improve completely or partially.^{11,12} 70% of the severely affected eyes in our study had good visual outcome, two of them were totally blind for a period of two to ten days. This is in comparison to the previous reports- 71%¹³, 75%¹⁴, and 79%.¹⁵ We had improvement in majority of affected eyes (82%) which is quite similar to the previous literature. Other larger surgical series employing the transsphenoidal approach, have reported post operative improvement in 74-95% of patients.^{16,17,18,19}

Ocular motor palsies prevalence with pituitary adenoma ranges from 1% to 14%²⁰, it was present in 5% of our patients and 3rd cranial nerve involvement is most common.²¹ Hollenhorst and Younge reviewed 1000 cases of pituitary adenoma and found 59 (5.9%) with cranial nerves palsies.¹⁶ Sixth nerve palsy can be involved either because of direct tumor extension and compression or because of raised ICP and obstructive hydrocephalus by significant large tumors.²²

CONCLUSION

A large number of patients with pituitary adenoma and visual defects improved after transsphenoidal surgical procedure, showing that visual defects are not irreversible. Visual improvement was observed in about 80% of the cases. There was significant improvement in 40% of cases.

Younger age, male sex, short duration of symptoms, small tumors without suprasellar/parasellar extensions, pituitary apoplexy and hemorrhage findings during operation are good prognostic factors for visual defects by these tumors.

Excellent visual improvement can be achieved in severely affected eyes with early intervention. Hence awareness regarding the reversibility of vision in pituitary adenoma needs to be increased among the ophthalmologists and medical community so that early referral is made possible.

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