

ORIGINAL ARTICLE

Visual Finding in Patient with Pituitary Macroadenoma Underwent Transphenoid Surgery

Reny Setyowati¹, Adiguno Suryo Wicaksono², Rahmat Andi Hartanto², Indra Tri Mahayana¹, Suhardjo Prawiroranu¹

¹Department of Ophthalmology, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada/Dr. Sardjito General Hospital, Yogyakarta, Indonesia

²Department of Neurosurgery, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada/Dr. Sardjito General Hospital, Yogyakarta, Indonesia

E-mail: reni.setyowati88@gmail.com

ABSTRACT

Aim: The main aim of surgery in pituitary macroadenoma are restoration of visual acuity and visual field defects by decompression of the optic chiasm. Pituitary macroadenoma has slow growth pattern. This study describes the visual status of patients with pituitary macroadenoma and the post operative results.

Methods : Retrospective, descriptive interventional study of patients with pituitary adenoma underwent transphenoid surgery at Dr Sardjito General Hospital, Yogyakarta.

Results : There were 7 patients age 29-65 years old, mean age was 42 years old, consist of 3 male and 4 female and were followed-up varies between 1 until 6 months. There was history of previous transphenoid surgery in 1 patients. Duration of patient's complaint varies between 1 until 36 months and the mean duration was 12 months. In 6 patients there were bitemporal hemianopia and 1 patients had general depression visual field defect. Visual acuity pre operative was between 0,003 until 1,0 , and the mean visual acuity was 0,1 (right eye) and 0,18 (left rye). Visual acuity post operative was between no light preception until 1,0 , and the mean visual acuity was 0,27 (right eye) and 0,19 (left eye) but there were no statistically significant differences. Fundus examination reveal optic atrophy in all patients.

Conclusion : Transphenoidal surgery is the treatment of choice in patients with pituitary macroadenoma. Prolonged duration of symptoms and delay of surgery may impact the visual status.

Keywords : *Visual status, visual field defect, pituitary macroadenoma, transphenoid surgery, post operative*

Pituitary adenomas are common lesions comprising 10 to 15% of all primary brain tumors. Incidental pituitary tumors are found in approximately 15% of autopsies. The majority of these lesions are histologically benign. Clinically, they present as functioning or non-functioning pituitary adenomas.¹

Pituitary adenoma (PA) originates from the anterior lobe of the pituitary gland. When a PA is sufficiently large to compress the visual pathway (typically the optic chiasm, optic nerve and optic tract), the patients often present visual deficiencies, including a visual acuity impairment and/or visual field defect.² A spectrum of visual manifestations has been reported with these

tumors, ranging from the absence of any visual symptoms to severe visual field defects and loss of vision. The prevalence of visual field defects in pituitary adenomas varies from 37 to 96% in different studies. The most common visual field defect is bitemporal hemianopia. However, other types of visual field deficits may also be observed.^{1,3}

Despite ongoing advances in the medical and radiotherapeutic management of pituitary tumors, surgical resection remains the therapy of choice for the vast majority of these lesions. The current treatment for PA includes medicine, a craniotomy and a microscopic or endoscopic transsphenoidal operation. A surgical resection is indicated in cases with progressive visual field deterioration.² Trans-sphenoidal surgery is performed when adequate resection is possible while sparing the normal gland. From previous study in the early phase, transphenoidal surgery for pituitary macroadenoma results in a progressive recovery of visual field in 95% of patients.⁴

The main aim of surgery in pituitary macroadenoma are restoration of visual acuity and visual field defects by decompression of the optic chiasm. Pituitary macroadenoma has slow growth pattern. This study describes the visual status of patients with pituitary macroadenoma and the post operative results.

SUBJECT AND METHODS

This is retrospective descriptive patient record review study at the department of ophthalmology and neurosurgery in 2015 at Dr Sardjito General Hospital, Yogyakarta. Patients with pituitary macroadenoma undergoing transphenoidal surgical resection were included in the study after providing written informed consent for hospital based review study.

Inclusion Criteria

Patients over 10 years of age diagnosed with pituitary adenomas on radiological imaging.

Exclusion Criteria

1. Patients with ocular media opacities.
2. Patients with glaucoma, choroiditis, retinitis pigmentosa, optic neuritis, or any other ocular pathology affecting the visual field.
3. Patients physically and/or mentally unfit for detailed ocular examination.
4. Patients in whom visual field testing was not possible.

RESULT

Table 1. Demographic data

Case number	Sex/Age	Occupation	Duration of Ocular Symptom
1	M/34	Entrepreneur	156 weeks
2	M/52	Entrepreneur	2 weeks
3	F/32	Housewife	28 weeks
4	M/36	Civil worker	156 weeks
5	F/47	Worker	4 weeks
6	F/65	Worker	8 weeks
7	F/29	Housewife	16 weeks

Baseline demographic data displays in table 1. There were 7 patients age 29-65 years old, mean age was 42 years old, consist of 3 male and 4 female and were followed-up varies between 1 until 6 months. There was history of previous transphenoid surgery in 1 patients.

Duration of patient's complaint varies between 1 until 36 months (2-156 weeks) and the mean duration was 12 months. Patients complaint were headache, blurred vision and restricted visual field.

In 6 patients there were bitemporal hemianopia and 1 patients had general depression visual field defect. Visual acuity pre operative was between 0,003 until 1,0 , and the mean visual acuity was 0,1 (right eye) and 0,18 (left eye). Visual acuity post

operative was between no light preception until 1,0 , and the mean visual acuity was 0,27 (right eye) and 0,19 (left eye) but there were no statistically significant differences (p value = 0,164). Fundus examination reveal optic atrophy in all patients.

DISCUSSION

Pituitary adenomas are generally slow-growing, benign neoplasms which can compress the anterior visual pathway, resulting in loss of vision. In this study duration of patient's complaint varies between 1 until 36 months (2-156 weeks). Some factors influence this condition such as referral system, distance, radiology examination such as CT Scan or MRI, and limitation number of neurosurgeon may become barrier for patients to go to hospital and got medication.^{1,5,6}

Pituitary adenomas are usually classified into microadenomas, macroadenomas, and giant adenomas according to their size. The larger the pituitary adenoma is, the higher is the risk of optic chiasm or optic nerve compression. Anatomic relationships suggest that tumor extension 10 mm above the diaphragma sellae is necessary for the anterior visual pathway to become compressed.⁷

The typical visual field defect, bitemporal hemianopia, is due to the anatomical compression of the optic chiasm, which contains the crossing nasal fibers of each optic nerve. Nevertheless, the visual field defect actually depends on the relation between the optic chiasm and the tumor itself. If the tumor is anterior to the optic chiasm or if the patient has an anatomical post-fixed chiasm, conditions such as central scotoma, arcuate scotoma, and monocular visual constriction can be noted. If the tumor compresses the optic tracts or the patient has a pre-fixed chiasm, a homonymous hemianopia may be seen.^{6,7} In our report 6 patients had bitemporal hemianopia and 1 patient had general depression on visual field defect.

This study had varying degrees of visual impairment. Visual acuity pre operative was between 0,003 until 1,0. Visual acuity post operative was between no light preception until 1,0. Some of the previous studies have already discussed the relationship between the optic chiasm position and visual loss. Ikeda and Yoshimoto⁸ found that visual impairment occurred when the displacement of the optic chiasm was more than 8 mm above the reference line on the sagittal image and more than 13 mm above on the coronal image on brain MRI.

Monteiro et al.⁹ have also shown that tumor exceeding 10 mm above the sagittal standard line and 12 mm above the coronal standard line had a significant effect on visual loss. Transsphenoidal surgical resection or craniotomy can decompress the anterior visual pathway, leading to visual recovery. Visual improvement occurs in three phases, with the earliest phase of improvement taking place one week after surgery. It has been postulated that the initial improvement in vision is the result of recovery of nerve conduction.⁷ Later improvement is thought to be due to remyelination of decompressed optic pathways. Trans-sphenoidal surgery is the surgical treatment of choice for most pituitary adenomas because it is minimally invasive and highly successful.

Musuluman et al.¹⁰ found that tumor size was not significantly associated with the postoperative visual impairment score but preoperative visual deficit and the time interval between the initial visual symptom and surgery were significantly associated with the postoperative visual impairment score. A shorter duration of symptoms, younger age, and a better preoperative BCVA have been reported to be associated with better postoperative recovery of VF by some investigators^{9,11} but not others.¹²

In this study there were improvement, but no statistically significant differences in visual acuity post operatively. Fundus examination reveal optic atrophy in all patients. This finding showed the optic nerve head were pale in all

patients and this may be caused by the barrier between patient and the doctor. Transphenoidal surgery is the treatment of choice in patients with pituitary macroadenoma. Prolonged duration of symptoms and delay of surgery may impact the visual status.

This study limitation were small sample size, and time to follow up. An inverse correlation was found between the duration of symptoms and postoperative visual field recovery, signifying the importance of early surgical intervention. There is a need for increasing awareness among the ophthalmic community and other physicians for timely referral of these patients and prompt neurosurgical intervention.

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Reference

1. Asa SL, Ezzat S. The pathogenesis of pituitary tumours. *Nat Rev Cancer* 2002;2:836-849.
2. Ezzat S, Asa SL, Couldwell WT, Barr CE, Dodge WE, Vance ML, et al. The prevalence of pituitary adenomas: a systematic review. *Cancer* 2004;101:613- 619.
3. Yeh PJ, Chen JW. Pituitary tumors: surgical and medical management. *Surg Oncol* 1997;6:67-92.
4. Gnanalingham KK, Bhattacharjee S, Pennington R, Ng J, Mendoza N. The time course of visual field recovery following transphenoidal surgery for pituitary adenomas: predictive factors for a good outcome. *J Neurol Neurosurg Psychiatry* 2005;76:415- 419
5. Mortini P, Losa M, Barzaghi R, Boari N, Giovanelli M. Results of transsphenoidal surgery in a large series of patients with pituitary adenoma.
6. Levy A. Pituitary disease: presentation, diagnosis, and management. *J Neurol Neurosurg Psychiatry* 2004;75:iii47-iii52.
7. Poon A, McNeill P, Harper A, O'Day J. Patterns of visual loss associated with pituitary macroadenomas. *Aust N Z J Ophthalmol* 1995;23:107-115.
8. Ikeda H, Yoshimoto T : Visual disturbances in patients with pituitary adenoma. *Acta Neurol Scand* 92 : 157-160, 1995
9. Monteiro ML, Zambon BK, Cunha LP : Predictive factors for the development of visual loss in patients with pituitary macroadenomas and for visual recovery after optic pathway decompression. *Can J Ophthalmol* 45 : 404-408, 2010
10. Müslüman AM, Cansever T, Yılmaz A, Kanat A, Oba E, ÇavuŞođlu H, et al. : Surgical results of large and giant pituitary adenomas with special consideration of ophthalmologic outcomes. *World Neurosurg* 76 : 141-148; discussion 63-66, 2011
11. Monteiro ML, Zambon BK, Cunha LP : Predictive factors for the development of visual loss in patients with pituitary macroadenomas and for visual recovery after optic pathway decompression.