Three Years Experience of Suprasellar Tumors in Neuro-Ophthalmology Clinic

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Objective: *To examine pre-treatment ophthalmic presentations and treatment results and to identify factors that may influence improved visual outcomes in patients with suprasellar tumor.*
Material and Method: *The medical records of patients with suprasellar tumors who were diagnosed between July 2005 and June 2008 in the neuro-ophthalmology clinic of Songklanagarind Hospital were retrospectively reviewed by two ophthalmologists. Pre-treatment ophthalmic presentations and treatment results were analyzed. Determinants of improved visual outcomes were identified by using univariate and multivariate regression analysis.*
Results: *Of 40 patients, 55% were male and 45% were female, with a median age of 38 years. The most common pre-treatment ophthalmic presentations were blurred vision (92.5%), headache (10%) and eye pain (5%). The most common tumor was pituitary adenoma (macroadenoma and prolactinoma). Visual improvement was achieved in pituitary adenoma in 20 of 25 eyes (80%), meningioma in 8 of 12 eyes (67%) and other tumors in 2 of 5 eyes (40%). No determinants related to better visual outcomes were found.*
Conclusion: *The most common presentation of suprasellar tumor was blurred vision. There were no pre-treatment factors that related to visual outcomes in the present study.*

Keywords*: Macroadenoma, Meningioma, Pituitary adenoma, Pituitary tumor*

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Different studies have found the common presenting symptoms of suprasellar tumor to be blurred vision, headache, visual field defect, diplopia, amenorrhea and impotence[1-5]. Blurred vision, one of the commonest presenting symptoms in any eye clinic, is a symptom shared by many other eye diseases. Some ophthalmologists might misdiagnose the cause of the blurriness and try to correct it with inappropriate treatment, thus delaying further investigations to rule out optic nerve or chiasm compression from suprasellar tumor, leading possibly to axon damage or even blindness.

Even though suprasellar tumors are usually benign, slow growing and not fatal, early diagnosis and treatment are required to preserve vision and maintain the pituitary function[6,7]. The treatment options are medication, surgery, or radiation depending on the type of tissue involved and whether the tumor is removable. Bromocriptine is a dopamine agonist effective against prolactinomas, making surgery unnecessary for this type of tumor[8]. Surgery is usually required to restore visual function in patients with pituitary tumors apart from prolactinomas[9,10]. Radiotherapy can be adjunctive therapy for residual tumors or inoperable cases. Studies attempting to identify predictors of visual outcome in cases of suprasellar tumors have so far been inconclusive. Pre-treatment visual acuity better than or equal to 20/100, younger age, and no disk pallor were found by Cohen et al to be predictors of successful outcomes[11], while other studies have found shorter duration of symptom and smaller size of tumor to be associated

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with better results[4,12-14]. However, other studies have failed to find any correlations with the same determinants[15,16].

The purpose of the present study was to examine pre-treatment ophthalmic presentations and treatment results, and to identify factors that may influence improved visual outcomes in patients with suprasellar tumor.

Material and Method

The medical records of suprasellar patients who had been treated at the neuro-ophthalmology clinic at Songklanagarind Hospital, the major tertiary care center in southern Thailand, over the 3-year period between July 2005 and June 2008 were reviewed by two ophthalmologists. The diagnostic determinations were based on both ICD 10 codes and the neuro-ophthalmology clinic database. The present study was approved by the Human Research Ethics Committee of the Faculty of Medicine of Prince of Songkla University, with which the hospital is associated.

The preoperative data from the medical records included age, sex, symptoms, duration of symptoms, visual acuity, color vision, presence and laterality of any relative afferent papillary defect, the presence of optic disk pallor, visual field examination and type of tumor. Short term (4-6 weeks) postoperative data included visual acuity, treatment modalities and serious complications.

Visual acuities were recorded on an Early Treatment Diabetic Retinopathy Study (ETDRS) visual acuity chart at 4 meters with correction. For statistical analysis all ETDRS values were converted to logMAR values.

The visual fields were tested with the Goldmann perimeter (Haag Streit AG, Bern, Switzerland). The V-4-e, III-4-e, and I-4-e stimuli were used to draw isopters. All tests were performed by experienced technicians.

Visual improvement after treatment was defined as when the patient improved at least 0.1 logMAR.

Descriptive statistics were used to analyze the baseline characteristics of presenting symptoms, tumor types and treatment outcomes. The patients were divided into three groups based on tumor types and treatment results analyzed in each group. Univariate and multivariate regression analysis were used to analyze the determinants of visual acuity outcomes. All data analyses were done using R program[17].

Results

Forty medical records were reviewed. Twenty-two of 40 patients (55%) were male and 18 of 40 patients (45%) were female. The median age of the patients was 38 years (range 10-82 years). The most common ophthalmic presentation was blurred vision (37/40 patients or 92.5%). Sixty-two percent (23/37 patients) complained of blurred vision in one eye. Headache and eye pain were presented in 4 (10%) and 2 (5%) patients, respectively. Only a single case of amenorrhea, diplopia, ptosis, and incidentally found was presented among these patients. Fifty-one eyes of 40 patients had blurred vision which had mean visual acuity 1.27 logMAR value (range 0.2-3). The mean duration of symptom was 15.7 months (range 3 days-7 years). Visual field defect types and diagnosis were shown in Table 1. The most common visual field defect was unilateral or bilateral hemianopia. The most common tumor was pituitary adenoma (macroadenoma and prolactinoma). Thirty-one patients received treatment and these were divided into three groups: pituitary adenoma, meningioma, and other. Mean visual acuity post treatment was improved to 0.71 logMAR value (range 0-3). Post-treatment visual improvement was best achieved in cases with pituitary adenoma (Table 2), but there were no statistically significant differences between the improvement and nonimprovement groups in any of the variables examined (Table 3). Table 4 shows that the results do not change after adjustment for age, sex, duration of symptoms and treatment method.

Discussion

The most common presentation of suprasellar tumor in the present study was blurred vision, which is similar to other studies reported by ophthalmologists[1-4,6,18], while headache and visual field defect were the most common presentations reported by pediatricians and endocrinologists respectively[19-21]. In the present study, the authors found that unilateral blurred vision was more common than bilateral blurred vision, a detail not mentioned in other studies. The authors found 2 cases (5%), one meningioma and one chordoma, who complained of eye pain, a symptom not mentioned in most other studies the authors are aware of, although a study from Kitthaweesin et al[18] did report 6/69 (9%) patients with this symptom. The authors hypothesize that the rare eye pain could be the result of direct compression of the ophthalmic branch of the trigeminal nerve from parasellar involvement, which could be more common in nonpituitary tumors than in pituitary adenomas.

Table 1. Type of visual field defect and diagnosis

Characteristic	Number	Percentage
Pre-operative visual fields (n = 40)		
Unilateral or bilateral quadrantanopia	4	10.0
Unilateral or bilateral hemianopia	11	27.5
Unilateral or bilateral three quadrants or more field loss	9	22.5
Junctional scotoma	7	17.5
Atypical field defect	9	22.5
Diagnosis (n = 40)		
Pituitary macroadenoma	14	35.0
Prolactinoma	7	17.5
Meningioma	10	25.0
Craniopharygioma	3	7.5
Other	6	15.0
Astrocytoma	2	
Glioma	1	
Chordoma	1	
Hemangiopericytoma	1	
Mass-like tuberculous meningitis	1	

Table 2. Improvement of visual acuity by tumor type and treatment method in 31 patients* (42 eyes)

Tumor type	Treatment method	Improvement (eyes)	Percentage
Pituitary adenoma		20/25	80.0
Prolactinoma	Bromocriptine	6/8	75.0
Macroadenoma	Surgery	14/17	82.0
Meningioma	Surgery	8/12	67.0
Other		2/5	40.0
	Radiation	1/3	33.0
	Surgery	1/2	50.0
Total		30/42	71.4

* Nine patients were excluded: 8 were lost follow-up and one patient with TB meningitis was referred to internist

Like other reports on suprasellar tumors, the most common type of tumor in our study was pituitary adenoma[7,18,22], followed by meningioma and craniopharyngioma. The number of craniopharyngiomas was surprisingly low (3/40, 7.5%), compared to 24-46% in previous studies[7,18,19], but this could have been because the authors had only 2 pediatric patients (5%). Because the craniopharyngioma is common in childhood.

Based on standard treatments similar to other studies, our post-treatment results were comparably good. There were no complications that lowered the patients' quality of life after treatment in our institute.

The main limitation of the present study was an inadequate sample size to usefully compare the post-treatment visual outcomes in each tumor group, or to compare the determinants between the improvement and non-improvement groups, for which a larger study is needed. However, 40 patients over a 3-year period have still provided useful information, especially in terms of clinical presentations. Another limitation was the relatively short follow-up period (4-6 weeks), which may have led to an underestimation of the number of the eyes with visual improvement than a longer follow-up (up to 6 months) might have shown, as another study has found that notable improvements in the recovery of visual function after decompression of the anterior visual pathways can be found for up to 4 months following successful treatment[23].

Table 3. Comparison of determinants between improvement and non-improvement of visual acuity in 31 patients* (42 eyes)

Determinant	Improvement of visual acuity		p-value	
	Yes	No		
Age in years, mean (SD)	40.1 (16.8)	36.8 (20)	0.587	NS
Sex, no. of eyes (%)			0.591	NS
Male	13 (43.3)	7 (58.3)		
Female	17 (56.7)	5 (41.7)		
Duration in months, median (IQR**)	3 (2, 11.5)	4.5 (1, 45)	0.556	NS
Pre-treatment visual acuity in log units, median (IQR)	1 (0.9, 1.9)	0.8 (0.4, 2)	0.446	NS
Optic nerve pallor, no. of eyes (%)			0.740	NS
Pale	12 (40)	4 (33.3)		
Not pale	18 (60)	8 (66.7)		
Type of tumor, no. of eyes (%)			0.207	NS
Pituitary tumor	20 (66.7)	5 (41.7)		
Meningioma	8 (26.7)	4 (33.3)		
Other	2 (6.7)	3 (25)		
Treatment type, no. of eyes (%)			0.341	NS
Bromocriptine	6 (20)	2 (16.7)		
Surgery	23 (76.7)	8 (66.7)		
Radiation	1 (3.3)	2 (16.7)		

* Nine patients were excluded: 8 were lost follow-up and one patient with TB meningitis was referred to internist
** IQR (interquartile range) = percentile 25^{th} and percentile 75^{th}

Table 4. Univariate and multivariate analysis of determinants affecting the improvement of visual acuity in 31 patients (42 eyes)

Determinant	Univariate Crude OR (95% CI)	Multivariate Adjusted OR (95% CI)	p-value
Age	1.01 (0.97, 1.05)	0.99 (0.95, 1.04)	0.824
Sex: female vs. male	1.83 (0.47, 7.10)	1.57 (0.35, 7.11)	0.557
Duration of symptoms	0.98 (0.95, 1.00)	0.98 (0.95, 1.10)	0.263
Treatment method			
Medication	1.00 (reference)		0.751
Surgery	0.96 (0.16, 5.75)	0.97 (0.13, 7.15)	
Radiation	0.17 (0.01, 2.98)	0.30 (0.01, 8.70)	

In conclusion, the authors would note that even though patients present with a complaint of unilateral or bilateral blurred vision for which the common diagnosis is refractive error or cataract, it is highly advisable to give all patients a complete eye examination including bilateral visual field tests to avoid delayed or misdiagnosis of more serious conditions such as suprasellar or brain tumors. Permanent blindness can occur in eyes with long-standing axon compression and neuroimaging should be done as soon as possible when optic nerve or chiasm compression is suspected. The authors recommend that patients with suprasellar tumor who have impaired visual function should receive treatment based on the tumor type. In the present study patients with pituitary macroadenoma benefited best from surgery, and patients with meningioma had better visual improvement than others.

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References

1. Chamlin M, Davidoff LM, Feiring EH. Ophthalmologic changes produced by pituitary tumors. Am J Ophthalmol 1955; 40: 353-68.
2. Hollenhorst RW, Younge BR. Ocular manifestations produced by adenomas of pituitary gland: analysis of 1000 cases. In: Kohler. PO, Ross GT, editors. Diagnosis and treatment of pituitary tumors. Amsterdam: Excerpta Med; 1973: 53-68.
3. Wray SH. Neuro-ophthalmological manifestations of pituitary and parasellar lesions. Clin Neurosurg 1976; 24: 86-117.
4. Klauber A, Rasmussen P, Lindholm J. Pituitary adenoma and visual function. The prognostic value of clinical, ophthalmological and neuroradiologic findings in 51 patients subjected to operation. Acta Ophthalmol (Copenh) 1978; 56: 252-63.
5. Anderson D, Faber P, Marcovitz S, Hardy J, Lorenzetti D. Pituitary tumors and the ophthalmologist. Ophthalmology 1983; 90: 1265-70.
6. Masaya-anon P, Lorpattanakasem J. Intracranial tumors affecting visual system: 5-year review in Prasat Neurological Institute. J Med Assoc Thai 2008; 91: 515-9.
7. Suri A, Narang KS, Sharma BS, Mahapatra AK. Visual outcome after surgery in patients with suprasellar tumors and preoperative blindness. J Neurosurg 2008; 108: 19-25.
8. Minniti G, Esposito V, Piccirilli M, Fratticci A, Santoro A, Jaffrain-Rea ML. Diagnosis and management of pituitary tumours in the elderly: a review based on personal experience and evidence of literature. Eur J Endocrinol 2005; 153: 723-35.
9. Bulters DO, Shenouda E, Evans BT, Mathad N, Lang DA. Visual recovery following optic nerve decompression for chronic compressive neuropathy. Acta Neurochir (Wien) 2009; 151: 325-34.
10. Shou XF, Li SQ, Wang YF, Zhao Y, Jia PF, Zhou LF. Treatment of pituitary adenomas with a transsphenoidal approach. Neurosurgery 2005; 56: 249-56.
11. Cohen AR, Cooper PR, Kupersmith MJ, Flamm ES, Ransohoff J. Visual recovery after transsphenoidal removal of pituitary adenomas. Neurosurgery 1985; 17: 446-52.
12. Symon L, Jakubowski J, Kendall B. Surgical treatment of giant pituitary adenomas. J Neurol Neurosurg Psychiatry 1979; 42: 973-82.
13. Trobe JD, Tao AH, Schuster JJ. Perichiasmal tumors: diagnostic and prognostic features. Neurosurgery 1984; 15: 391-9.
14. Blaauw G, Braakman R, Cuhadar M, Hoeve LJ, Lamberts SW, Poublon RM, et al. Influence of transsphenoidal hypophysectomy on visual deficit due to a pituitary tumour. Acta Neurochir (Wien) 1986; 83: 79-82.
15. Lennerstrand G. Visual recovery after treatment for pituitary adenoma. Acta Ophthalmol (Copenh) 1983; 61: 1104-17.
16. Ciric I, Mikhael M, Stafford T, Lawson L, Garces R. Transsphenoidal microsurgery of pituitary macroadenomas with long-term follow-up results. J Neurosurg 1983; 59: 395-401.
17. The R Project for Statistical Computing [homepage on the Internet]. R Development Core Team. R: A language and environment for statistical computing. 2009 [cited 2010 Mar 27]. Available from: http://www.R-project.org.
18. Kitthaweesin K, Ployprasith C. Ocular manifestations of suprasellar tumors. J Med Assoc Thai 2008; 91: 711-5.
19. Likasitwattanakul S, Katanyuwong K, Poneprasert B. Brain tumors in children at Maharaj Nakorn Chiang Mai hospital. Chiang Mai Med Bull 2003; 42: 139-47.
20. Peerapatdit T, Chaivichitmalakul P, Lertwanarak R, Choptangsin S, Plengvidhya N, Sriussadaporn S, et al. Craniopharyngioma: a review of 14 cases at Siriraj hospital. Siriraj Med J 2006; 58: 1091-4.
21. Ersahin Y, Yurtseven T, Ozgiray E, Mutluer S. Craniopharyngiomas in children: Turkey experience. Childs Nerv Syst 2005; 21: 766-72.
22. Freda PU, Wardlaw SL, Post KD. Unusual causes of sellar/parasellar masses in a large transsphenoidal surgical series. J Clin Endocrinol Metab 1996; 81: 3455-9.
23. Kerrison JB, Lynn MJ, Baer CA, Newman SA, Biousse V, Newman NJ. Stages of improvement in visual fields after pituitary tumor resection. Am J Ophthalmol 2000; 130: 813-20.

ประสบการณ์ 3 ปี ของการตรวจรักษาเนื้องอกสมองบริเวณเหนือ sella ในคลินิกจักษุประสาท

นิพัฒน์ เอื้ออารี, ฉัตรมงคล พรวนเจริญ, ฐากูร เอี้ยวสกุล, สิริพร หิรัญแพทย์, รัศมี สังข์ทอง

วัตถุประสงค์: *ศึกษาอาการก่อนการรักษาเนื้องอกสมองบริเวณเหนือ sella และผลการรักษาเพื่อระบุปัจจัยที่อาจมีผลต่อการดีขึ้นของสายตา*

วัสดุและวิธีการ: *ทบทวนย้อนหลังเวชระเบียนผู้ป่วยเนื้องอกสมองบริเวณเหนือ sella วินิจฉัยระหว่างเดือน กรกฎาคม พ.ศ. 2548 ถึงเดือนมิถุนายน พ.ศ. 2551 ในคลินิกจักษุประสาทโดยจักษุแพทย์ 2 คน วิเคราะห์สิ่งแสดงทางจักษุก่อนการรักษา และผลการรักษาจำแนกตัวกำหนดการดีขึ้นของสายตาด้วยการวิเคราะห์ถดถอยตัวแปรเดี่ยวและหลายตัวแปร*

ผลการศึกษา: *ผู้ป่วยจำนวน 40 ราย ร้อยละ 55 เป็นเพศชาย ร้อยละ 45 เป็นเพศหญิง อายุมัธยฐาน 38 ปี อาการก่อนการรักษาที่พบบ่อยที่สุดได้แก่ ตามัว (ร้อยละ 92.5) รองลงไป ปวดศีรษะ (ร้อยละ 10) และปวดตา (ร้อยละ 5) เนื้องอกที่พบบ่อยที่สุดคือ เนื้องอกต่อมใต้สมอง (เนื้องอกต่อมขนาดใหญ่ และเนื้องอกของต่อมใต้สมองที่สร้างฮอร์โมนโปรแลคติน) เนื้องอกต่อมใต้สมองหลังการรักษาสายตาดีขึ้น 20 ใน 25 ตา (ร้อยละ 80) ส่วนเนื้องอกเยื่อหุ้มสมองดีขึ้น 8 ใน 12 ตา (ร้อยละ 67%) และเนื้องอกอื่นดีขึ้น 2 ใน 5 ตา (ร้อยละ 40) ไม่พบตัวกำหนดเกี่ยวข้องกับการดีขึ้นของสายตา*

สรุป: *สิ่งแสดงที่พบบ่อยที่สุดของเนื้องอกสมองบริเวณเหนือ sella คือตามัว และไม่พบปัจจัยก่อนการรักษาใดสัมพันธ์กับผลที่ได้รับทางสายตา*