The Correlation between Intracranial Meningioma and Ophthalmologic Manifestations in Siriraj Hospital

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Background: *Visual loss is the most common ophthalmologic manifestation of intracranial meningioma which predominantly located in the tuberculum sellae and sphenoid bone.*
Objective: *To determine the correlation between intracranial meningioma and its ophthalmologic manifestations and visual outcome.*
Material and Method: *Patients with intracranial meningioma in Siriraj Hospital were retrospectively reviewed. Demographic data, ophthalmologic manifestations, location of tumor, treatment and visual outcome were collected and analyzed.*
Results: *Fifty patients, who underwent surgical tumor resection, were divided into 2 groups regarding preoperative visual status, including group I (preoperative VA ≥6/60) consisting of 26 patients (52%) and group II (preoperative VA <6/60 with exclusion of patients with blindness) consisting of 24 patients (48%). There was statistically significant improvement of postoperative VA in group II (p = 0.001). Regarding duration of preoperative visual symptom, 50 patients were divided into group I (24 cases with the duration <7 months) and group II (26 cases with the duration ≥7 months). There was no correlation between duration of preoperative visual symptom and postoperative visual outcome.*
Conclusion: *Visual improvement after surgical treatment was significantly found in patients with intracranial meningioma who have VA <6/60.*

Keywords: *Intracranial meningioma, Visual outcome*

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Intracranial meningioma has been found approximately 20% of all primary intracranial tumors[1]. This is most commonly found in middle to old age, and female is 2 to 3 folds more common than male. The etiology is still unclear, but may associate with estrogen and progesterone receptors of tumor[2]. Intracranial meningioma is less common in childhood and teenage, but more aggressive than adult[3]. Patients present with various signs and symptoms of neurologic or ophthalmologic manifestation depend on the location of tumor. Cavernous sinus tumor presents with diplopia. Middle cranial fossa tumor presents with visual loss and papilledema. Patients with optic have nerve sheath meningioma visual loss, proptosis and strabismus, while tuberculum sellae tumor presents only visual loss. Neurological manifestations maybe headache, seizure, dizziness/vertigo, hearing loss or behavior change.

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Correlation between Intracranial meningioma and its ophthalmologic manifestations is important for accurate diagnosis and treatment with surgery or radiation[4]. Especially some patients present with ophthalmologic symptoms before other neurologic symptoms. Intracranial meningioma is a benign tumor, early diagnosis leads to better outcome of treatment.

This study presented the correlation of intracranial meningioma and ophthalmologic manifestation in Siriraj Hospital. Visual acuity (VA) before and after the treatment were compared to determine surgical outcome.

Material and Method

Ninety-three patients with intracranial meningioma in Siriraj Hospital between 2004 and 2009 were retrospectively reviewed under an ethical committee approval. Demographic data, ophthalmologic manifestations, duration from onset of symptoms to surgery, location of tumor, treatment, preoperative and postoperative visual outcomes were collected and

analyzed. Changes of VA were defined by 2 lines difference of Snellen chart.

For statistical analysis, descriptive analysis was performed. Mean and SD were used for quantitative data while number and percentage were used for qualitative data. Comparisons of preoperative and postoperative VA were performed using Chi-square test.

Results

There were 446 intracranial meningioma patients treated in Siriraj Hospital from January 2004 to December 2009. Three hundred fifty three patients were excluded for incomplete medical record. Therefore 93 patients with 121 lesions were included for analysis. There were 82 females (88.2%) and 11 males (11.8%) with a ratio of 7.5:1 in this study. Mean age at the surgery was 50.9 (range 16 to 80 years).

Ophthalmologic symptoms correlate to location of tumor

Common signs and symptoms were visual loss in 58 patients (62.4%), visual field defect in 38 patients (40.9%), optic atrophy in 28 patients (30.1%) and proptosis 12 patients (12.9 %) (Fig. 1). Common locations were the tuberculum sellae (25.2%), sphenoid bone (21.8%), and cerebellopontine angle (10.1%) (Fig. 2).

Forty-three patients were further excluded (34 patients with inaccessible data and 9 patients could not be included for statistical analysis due to initial VA of light perception or no light perception). The remaining 50 patients were analyzed to assess prognostic factor on visual outcome. In these 50 patients, median preoperative VA was 6/60 and mean duration of symptom to surgery was 7 months.

Preoperative VA and postoperative visual outcome

Fifty patients who underwent surgical tumor resection were divided into 2 groups. Group I (26 patients, 52%), preoperative VA was better than or equal to 6/60 and median onset of symptoms to surgery was 9.2 months ranging from 5 weeks to 9 years. Group II (24 patients, 48%), preoperative VA was worse than 6/60 and median onset of symptoms to surgery was 6.4 months ranging from 5 weeks to 4 years. The median follow-up period was 2 years (2.5 months to 7 years).

In group I, 26 patients had preoperative VA of LogMAR 0.5 (±0.4 SD) (VA 6/19) and postoperative VA of LogMAR 0.7 (±0.6 SD) (VA 6/30) and $p = 0.202$ (Table 1). Postoperative visual outcome was improved

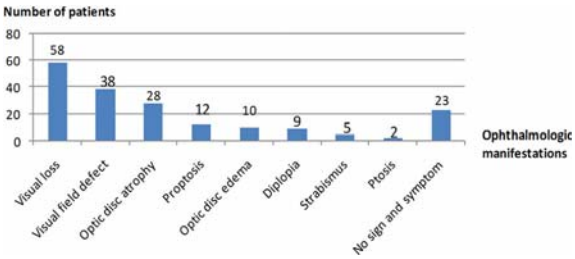

Fig. 1 Ophthalmologic manifestation in 93 intracranial meningioma patients.

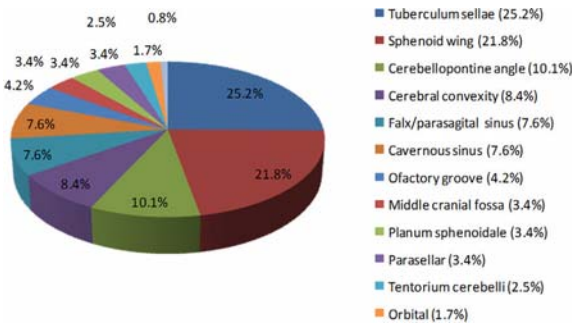

Fig. 2 Location of tumor.

in 5 patients (19.2%), remained stable in 6 patients (23.1%) and worse in 15 patients (57.7%) (Table 2).

In group II, 24 patient had preoperative VA of LogMAR 2.6 (±0.6 SD) (VA FC) and postoperative VA of LogMAR 1.7 (±1.0 SD) (VA 6/300) and $p = 0.001$ (Table 1). Postoperative visual outcome was improved in 13 patients (54.2%), remain stable in 8 patients (33.3%) and worse in 3 patients (13.5%) (Table 2).

Duration from onset of symptom to surgery and postoperative visual outcome

Fifty patients who underwent surgical tumor resection were divided into 2 groups. Group I (24 patients, 48%), had median onset of symptoms to surgery of <7 months. Preoperative VA were LogMAR 1.6 (±1.1 SD) (VA 6/240) and postoperative VA were LogMAR 1.3(±1.0 SD) (VA 6/120) and $p = 0.098$ (Table 3). Postoperative visual outcome was improved in 9 patients (37.5%), stable in 7 patients (29.2%) and worse in 8 patients (33.3%) (Table 4).

Group II (26 patients, 52%) had median onset of symptoms to surgery of ≥7 months. Preoperative VA were LogMAR 1.4 (±1.2 SD) (VA6/152) and postoperative VA were LogMAR 1.1 (±1.0 SD) (VA 6/76) and $p = 0.134$ (Table 3). Postoperative visual outcome was improved in 9 patients (34.6%), stable in

Table 1. Comparison of preoperative and postoperative VA according to preoperative visual status

		Preoperative	Postoperative	*p*-value
Group I (VA ≥6/60 to 6/6) (n = 26)	Mean VA of LogMAR (±SD)	0.5 (±0.4)	0.7 (±0.6)	0.202
	Mean VA	6/19	6/30	
Group II (VA HM to 6/60) (n = 24)	Mean VA of LogMAR (±SD)	2.6 (±0.6)	1.7 (±1.0)	0.001*
	Mean VA	FC½'	6/300	

* indicates statistical significance
FC = finger counting; HM = hand motion

Table 2. Postoperative visual outcome regarding preoperative visual status

	Postoperative visual outcome		
	Better	Stable	Worse
Group I (VA ≥6/60 to 6/6) (n = 26)	5 (19.2%)	6 (23.1%)	15 (57.1%)
Group II (VA HM to 6/60) (n = 24)	13 (54.2%)	8 (33.3%)	3 (13.5%)

Table 3. Comparison of preoperative and postoperative VA according to duration of preoperative visual symptom

		Preoperative	Postoperative	*p*-value
Group I (duration <7 months) (n = 24)	Mean VA of LogMAR (±SD)	1.6 (±1.1)	1.3 (±1.0)	0.098
	Mean VA	6/240	6/120	
Group II (duration ≥7 months) (n = 26)	Mean VA of LogMAR (±SD)	1.4 (±1.2)	1.1 (±1.0)	0.134
	Mean VA	6/152	6/76	

Table 4. Postoperative visual outcome regarding duration of preoperative visual symptom

	Postoperative visual outcome		
	Better	Stable	Worse
Group I (duration <7 months) (n = 24)	9 (37.5%)	7 (29.2%)	8 (33.3%)
Group II (duration ≥7 months) (n = 26)	9 (34.6%)	7 (26.9%)	10 (38.5%)

7 patients (26.9%) and worse in 10 patients (38.5%) (Table 4).

Discussion

The present study revealed that intracranial meningioma mostly presented with visual loss (62.4%) and visual field defect (40.9%), which is correlated with common manifestations reported in previous study. Frank et al[5] reported visual loss was found in 53% of patients, and visual field defect in 52%. Other less common manifestations were distinctively found, possibly due to variation in primary tumor location.

Yamashita et al[6] found that tumor may occurred in many sites, but common locations were the parasagittal, cerebral convexity and tuberculum sellae respectively. They also found that common locations that correlated with ophthalmologic manifestations were the tuberculum sellae and sphenoid bone due to optic pathway involvement. Previous studies of meningioma at the tuberculum sellae showed visual loss in 95.6 to 100% of patients[7-10] due to anatomical location of tumor that compressed the optic nerve and optic chiasma.

In addition, tumor occurs in female gender approximately 7.5 times more frequently than male found in this study which is correlated to previous report with the ratio of 2:1, and increasing to 3.15:1 in reproductive age[11]. Estrogen and progesterone receptor have been found on meningioma[12] which the tumor support its high prevalence of the tumor in female gender.

Analyzing preoperative and postoperative VA, the patients were divided into 2 groups. Group I were less severe visual loss (preoperative VA ≥6/60). Postoperative VA mostly got worse, only few got better or equal VA but the difference is not statistical significant. In group II which preoperative VA <6/60, visual outcome was better or equal in most of the patients. These can explain by the patients in group II had very severe visual loss, so chance of getting worse is less than in group I which had much better preoperative VA. However, even group II had improved postoperative VA, the patients still considered severe visual impairment. While group I, worsening of postoperative VA is still significantly better than group II.

Concerning timing of onset of symptoms to surgery, compare two groups of median onset of visual symptom of 7 months. Changes between preoperative and postoperative VA were not significantly different.

The authors found that severity of preoperative visual loss was a prognostic factor that influenced postoperative visual outcome. However, duration of symptoms to treatment is not a prognostic factor. This finding is different from previous studies that revealed, age, duration of symptom to the treatment, preoperative VA and optic disc appearance were worthily used as prognostic factors of visual outcome. Reported postoperative visual outcome were improved in 39.5 to 92%[7,9,13,14]. The result of this study was only 36%. This possibly due to, their study included only meningioma of the sellar region which directly involved in the optic pathway, but this study included all locations of the tumor. Therefore, some tumors may not involve the optic pathway.

Conclusion

Visual loss is the most common ophthalmologic manifestation of intracranial meningioma which predominantly located in the tuberculum sellae and sphenoid bone. Visual improvement following surgical treatment was significantly found in patients with initially severe visual impairment (VA <6/60).

What is already known on this topic?

Visual disturbance is a common clinical manifestation in patients with intracranial meningioma involving the tuberculum sellae and sphenoid bone. Prognostic factors influencing visual outcome in patients with meningioma include age, duration of symptom to treatment, preoperative VA and optic disc appearance.

What this study adds?

Improvement of postoperative vision is associated with degree of preoperative visual impairment, whereas visual outcome is not correlated with duration of preoperative visual symptom.

Potential conflicts of interest

None.

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ความสัมพันธ์ระหว่างเนื้องอกเยื่อหุ้มสมองในกะโหลกศีรษะกับอาการและอาการแสดงทางตาของผู้ป่วยที่มารับการรักษาในโรงพยาบาลศิริราช

วณิชา ชื่นกองแก้ว, ทิพย์อาภา เจริญพร, นิพนธ์ จิรภาไพศาล, ธีรพล วิทธิเวช

ภูมิหลัง: *อาการตามัวเป็นอาการทางตาที่พบบ่อยที่สุดในผู้ป่วยเนื้องอกเยื่อหุ้มสมองในกะโหลกศีรษะโดยเฉพาะเนื้องอกที่อยู่ในบริเวณฐานกะโหลกใกล้เส้นประสาทตาและกระดูกสฟีนอยด์*

วัตถุประสงค์: *เพื่อศึกษาความสัมพันธ์ระหว่างเนื้องอกเยื่อหุ้มสมองในกะโหลกศีรษะกับอาการและอาการแสดงทางตา และระดับสายตาภายหลังการรักษา*

วัสดุและวิธีการ: *การศึกษานี้เป็นการศึกษาย้อนหลังในผู้ป่วยที่มารับการรักษาเนื้องอกเยื่อหุ้มสมองในกะโหลกศีรษะโดยรวบรวมและวิเคราะห์ข้อมูลเกี่ยวกับ เพศ อายุ อาการและอาการแสดงทางตา ตำแหน่งของเนื้องอก การรักษา ระดับสายตาก่อนและหลังการรักษา*

ผลการศึกษา: *ในผู้ป่วย 50 รายซึ่งได้รับการผ่าตัดรักษาเนื้องอก แบ่งออกเป็น 2 กลุ่มตามระดับการมองเห็นก่อนผ่าตัด ได้แก่ กลุ่มที่ 1 (ระดับการมองเห็นดีกว่าหรือเท่ากับ 6/60) ประกอบด้วยผู้ป่วย 26 ราย (ร้อยละ 52) และกลุ่มที่ 2 (ระดับการมองเห็นแย่กว่า 6/60 โดยไม่นับผู้ป่วยที่ตาบอด) ประกอบด้วยผู้ป่วย 24 ราย (ร้อยละ 48) พบการดีขึ้น ของระดับการมองเห็นหลังผ่าตัดอย่างมีนัยสำคัญทางสถิติในกลุ่มที่ 2 (ค่า p เท่ากับ 0.001) ในแง่ของระยะเวลาของอาการและอาการแสดงทางตาก่อนผ่าตัดแบ่งผู้ป่วย 50 รายออกเป็น 2 กลุ่ม ได้แก่ กลุ่มที่ 1 (ผู้ป่วย 24 ราย ซึ่งมีระยะเวลาของอาการและอาการแสดงทางตาก่อนผ่าตัดน้อยกว่า 7 เดือน) และกลุ่มที่ 2 (ผู้ป่วย 26 ราย ซึ่งมีระยะเวลาของอาการและอาการแสดงทางตาก่อนผ่าตัดมากกว่าหรือเท่ากับ 7 เดือน) ไม่พบความสัมพันธ์ระหว่างระยะเวลาของอาการและอาการแสดงทางตาก่อนผ่าตัดกับผลระดับการมองเห็นหลังผ่าตัด*

สรุป: *ระดับสายตาหลังการผ่าตัดดีขึ้นอย่างมีนัยสำคัญทางสถิติในผู้ป่วยเนื้องอกเยื่อหุ้มสมองในกะโหลกศีรษะที่มีการสูญเสียระดับสายตามากก่อนผ่าตัด*
