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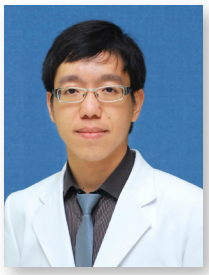
Neuro-Ophthalmic Diseases in a Tertiary Hospital in Thailand: A Prospective Study



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Abstract

Objective: To describe the incidence and pattern of neuro-ophthalmic diseases in the Ophthalmology Department of Siriraj Hospital, a tertiary hospital in Thailand.

Materials and Methods: This prospective study was conducted over a one-year period. New incident cases with confirmed diagnoses of neuro-ophthalmic diseases were enrolled. The data (comprising age, gender, presenting symptoms, and final diagnosis) were summated and evaluated.

Results: A total of 114 patients with new incident neuro-ophthalmic diseases were seen among a total of 9,600 new patients, giving an incidence of 1.2%. The incidence was higher among the 40–59 age group (53.5%). The most common disorders were non-arteritic anterior ischemic optic neuropathy (NAION; 7%), optic neuritis (7%), oculomotor palsy (6.1%), pituitary tumor (6.1%), and abducens palsy (5.3%). The most commonly presented symptoms were decreased vision (48.2%) and double vision (21.1%). Twenty-two patients (19.3%) were blind in the affected eye.

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Conclusions: Optic neuropathy and ocular motor palsies are the leading neuro-ophthalmic disorders. Although the overall incidence of neuro-ophthalmic diseases is low, diseases are often related to blindness or life-threatening conditions.

Keywords: incidence, neuro-ophthalmic diseases, neuro-ophthalmic disorders

บทคัดย่อ

อุบัติการณ์และลักษณะของโรคทางประสาทจักษุในโรงพยาบาลระดับตติภูมิในประเทศไทย: การศึกษาแบบติดตามไปข้างหน้า

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วัตถุประสงค์: เพื่อศึกษาอุบัติการณ์และลักษณะของโรคทางประสาทจักษุในโรงพยาบาลระดับตติยภูมิในประเทศไทย

วิธีการวิจัย: การวิจัยนี้เป็นการเก็บรวบรวมข้อมูลผู้ป่วยรายใหม่ที่ได้รับการวินิจฉัยเป็นโรคในกลุ่มโรคทางประสาทจักษุวิทยาในช่วงระยะเวลา 1 ปี ข้อมูลที่ถูกรวบรวมและนำมาวิเคราะห์ได้แก่ อายุ เพศ อาการสำคัญ และการวินิจฉัยสุดท้าย

ผลการวิจัย: รวบรวมผู้ป่วยรายใหม่ได้ทั้งสิ้น 114 ราย จากจำนวนผู้ป่วยนอกรายใหม่ที่มารับการรักษาประมาณ 9,600 ราย ซึ่งคิดเป็นอุบัติการณ์ในผู้ป่วยใหม่ร้อยละ 1.2 อุบัติการณ์พบมากที่สุดในกลุ่มอายุ 40-59 ปี (ร้อยละ 53.5) โรคที่พบมากที่สุดได้แก่ โรคเส้นประสาทตาส่วนหน้าขาดเลือด (ร้อยละ 7), โรคเส้นประสาทตาอักเสบ (ร้อยละ 7), โรคอัมพาตของกล้ามเนื้อตาจากเส้นประสาทสมองคู่ที่ 3 ผิดปกติ (ร้อยละ 6.1), เนื้องอกต่อมใต้สมอง (ร้อยละ 6.1) และโรคอัมพาตของกล้ามเนื้อตาจากเส้นประสาทสมองคู่ที่ 6 ผิดปกติ (ร้อยละ 5.3) อาการสำคัญที่พบบ่อยที่สุด ได้แก่ อาการตามัว (ร้อยละ 48.2) และอาการเห็นภาพซ้อน (ร้อยละ21.1) พบผู้ป่วย 22 ราย (ร้อยละ19.3) มีตามัวมากถึงเกณฑ์ตาบอดในข้างที่ผิดปกติ

สรุปผลการวิจัย: โรคเส้นประสาทตาและโรคอัมพาตของกล้ามเนื้อตาเป็นกลุ่มโรคที่พบได้บ่อยที่สุดของโรคทางประสาทจักษุ อุบัติการณ์ของโรคทางประสาทจักษุพบได้ไม่มาก แต่บ่อยครั้งที่โรคมีความรุนแรงถึงกับทำให้ผู้ป่วยตาบอดหรือสัมพันธ์กับโรคร้ายแรงที่เสี่ยงต่อชีวิต

คำสำคัญ: อุบัติการณ์, โรคทางประสาทจักษุวิทยา

Introduction

Neuro-ophthalmology, a subspecialty that merges the fields of neurology and ophthalmology, focuses on diseases of the nervous system that have manifestations in the visual system. Patients may present with decreased vision, transient visual loss, diplopia, abnormal eye movement, eye lid abnormalities, pupillary abnormalities, or (sometimes) illusions.

Although neuro-ophthalmic diseases are rare, they are usually serious and sometimes potentially life-threatening. The incidence and

pattern of neuro-ophthalmic conditions are usually separately collected for each disease, but rarely in overview.

In Singapore, Su Ann Lim and colleagues reported that the annual incidence of neuro-ophthalmic diseases was 9.81 per 100,000. They found that the three most common neuro-ophthalmic conditions were abducens nerve palsy (1.27 per 100,000), anterior ischemic optic neuropathy (1.08 per 100,000), and oculomotor nerve palsy (0.91 per 100,000).[1]

A two-year study in a tertiary eye centre in Nigeria reported a total of 76 new neuro-ophthalmic cases, giving an incidence of 4.47% of all new patients. The three most common neuro-ophthalmic conditions were ocular motor palsies (27.6%), optic neuropathies (22.4%), and migraine (14.5%), whereas the most frequent presenting features were poor vision (39.5%), double vision (18.4%), and headache (17.1%).[2]

Masson-Le Guen and colleagues retrospectively reviewed neuro-ophthalmic cases in France during a period of over five years. They reported that optic neuropathies were the most frequent etiologies.[3]

The incidence of neuro-ophthalmic diseases in Thailand has not been reported. Thus, the authors' main objective was to assess the incidence of neuro-ophthalmic diseases while the secondary objective was to demonstrate the most common neuro-ophthalmic conditions and presenting features.

Materials and Methods

This prospective study was conducted in a tertiary hospital, Siriraj Hospital, over a 12-month period from July 1, 2016, to June 30, 2017. Enrolled were all new patients who visited the neuro-ophthalmological clinic and were diagnosed with neuro-ophthalmic conditions. The patients were usually first seen by a general ophthalmologist and then referred to the neuro-ophthalmology clinic.

The presenting symptom was based on self-report. The definite diagnosis for each case was made by a neuro-ophthalmologist and based on the patient's history, physical examinations, specific investigations, and in some cases, neuroimaging.

The definition of neuro-ophthalmic diseases used in this study included (1) disorders of the optic nerve, chiasm, optic tract, or posterior visual pathways; (2) disorders that cause ocular misalignment, (3) neurogenic ptosis, lagophthalmos or spasms of the eyelid(s); (4) transient visual loss; (5) abnormal eye movements; and (6) disorder of the pupils. Parasellar region meningioma defined as meningioma that located around sella turcica, comprising the tuberculum sellae, planum sphenoidale, clinoid processes, sphenoid wing, cavernous sinuses, petroclival region, diaphragma sellae, or clivus.

The study was approved by the Siriraj Institutional Review Board and was conducted in accordance with the declaration of Helsinki for biomedical research.

Statistical analyses were performed using the statistical package IBM SPSS Statistics for Windows, version 20 (IBM Corp., Armonk, N.Y., USA). The distributions of the continuous and categorical

variables were presented as mean ± standard deviation and frequency/percentages respectively. Demographic data of the neuro-ophthalmic cases were compared with data of Bangkok population by using a Chi-square test. A P-value of < 0.05 indicated statistical significance.

Results

During the 1-year study period, 114 neuro-ophthalmic cases were seen among a total of 9,600 new patients, resulting in an overall incidence rate of 1.2%. The new incident cases had a mean age of 50.1 (± 17.3) years (median age of 51 years, and age range of 5 to 85 years). There were 43 (37.7%) men and 71 (62.3%) women.

The incidences were higher for the 40–59 and ≥ 60 age groups (p = < 0.001 and p = 0.012, respectively; (Table 1). Although the incidence was higher for females than males, there was no significant difference when compared with general population (p = 0.06; Table 1).

Table 2 describes the clinical presentations of the 114 patients with neuro-ophthalmic disease. The most frequent presenting symptoms were decreased vision (48.2%) and double vision (21.1%). There were 14 patients that presented with more than one symptom; consisted of 8 patients with diplopia and ptosis, 3 patients with decrease vision and diplopia, 1 patient with decrease vision and oscillopsia, 1 patient with chronic retrobulbar headache and transient visual loss, and 1 patient with decrease vision, ptosis and oscillopsia.

Non-arteritic anterior ischemic optic neuropathy (NAION) and optic neuritis were the most common, having an incidence of 7% of new neuro-ophthalmic cases. They were followed by oculomotor nerve palsy (6.1%), pituitary tumor (6.1%), and abducens nerve palsy (5.3%; Table 3).

In the case of patients younger than 50 years, optic neuritis was the most common neuro-ophthalmic disease (15.1% [8/53]), followed by

Table 1 Comparison between Neuro-ophthalmic cases and Bangkok population.

Demographic data	No. (%)		P-value[b]
	Neuro-ophthalmic cases	Bangkok population[a]	
Age			
< 20	5 (4.4)	1194.2 (21.7)	< 0.001
20–39	18 (15.8)	1630 (29.6)	0.002
40–59	61 (53.5)	1741.8 (31.7)	< 0.001
≥ 60	30 (26.3)	936.9 (17)	0.012
Sex			
Female	71 (62.3)	2919.2 (53)	0.06

a = the 2016 population of Bangkok. Data are in multiples of 1,000. (Source: Registration Administration of Provincial Admin, Department of Provincial Administration)

b = Chi-square test

Table 2 Clinical presentations of neuro-ophthalmic cases

Presenting symptom	No. (%)[a]
Decreased vision	55 (48.2)
Right	15 (13.2)
Left	20 (17.5)
Both	20 (17.5)
Transient visual loss	4 (3.5)
Diplopia	24 (21.1)
Oscillopsia	2 (1.8)
Eyelid abnormalities	
Ptosis	19 (16.7)
Spasm	8 (7.0)
Lagophthalmos	3 (2.6)
Chronic retrobulbar headache	1 (0.9)
Non-ophthalmic symptoms	13 (11.4)

a = Fourteen patients presented with more than one symptom.

oculomotor nerve palsy (7.5% [4/53]; Table 3). On the other hand, among patients 50 years and older, NAION and pituitary tumor were the most common (9.8% [6/61]), followed by abducens nerve palsy, and hemifacial spasm (8.2% [5/61]; Table 3).

Fifty-five patients (48.2%) presented with blurry vision in one or both eyes. After their diagnoses were completed, we found that 67.3% (37/55) had optic neuropathy, 21.8% (12/55) had disorders of the optic chiasm, and 10.9% (6/55) had disorders of other visual pathways. Of those patients, 22 were blind (a Snellen visual acuity not better than 3/60) in the affected eye, representing 19.3% (22/114) of all cases and 40% (22/55) of patients who presented with decreased vision.

The causes of blindness were variable. They were NAION (1 case), optic neuritis (3 cases), traumatic optic neuropathy (1 case), chronic papilledema (2 cases), compressive optic neuropathy (3 cases), optic nerve hypoplasia (1 case), toxic optic neuropathy (1 case), idiopathic orbital apex syndrome (1 case), sinusitis-related optic neuropathy (1 case), nonspecific optic atrophy (2 cases), parasellar meningioma (4 cases), ruptured arteriovenous malformation (1 case), and abducens nerve palsy coexist with maculopathy (1 case).

Thirteen patients with known central nervous system diseases underwent visual field testing and were found to have abnormal results. Those patients had initially presented to the hospital with non-ophthalmic symptoms. Most of them (10/13) suffered from intracranial tumors.

Discussion

This prospective study was conducted at the neuro-ophthalmology clinic, which is part of the Ophthalmology Department; thus all involved patients presented with eye symptoms or abnormal visual functions. Among all the new patients who visited the eye clinic, we found an overall neuro-ophthalmic incidence of 1.2%. The incidence rate was lower than that found in the Nigerian study by Omoti et al.[2] Because of the broad definition for neuro-ophthalmic diseases and differences in consulting criteria, the incidence of some disorders as well as the overall incidence can differ from study to study. One-sixth of the patients in the study conducted in Nigeria presented with headache, and most cases were

Table 3 Pattern of neuro-ophthalmic diseases

Disease group and diagnosis[a]	All; No. (%) (n = 114)	< 50 years; No. (%) (n = 53)	≥ 50 years; No. (%) (n = 61)
Decreased vision or visual field defect	68 (59.6)	31 (58.5)	37 (60.7)
Disorders of optic nerve	38 (33.3)		
Ischemic optic neuropathy (NAION)	8 (7)	2 (3.8)	6 (9.8)
Optic neuritis	8 (7)	8 (15.1)	-
Traumatic optic neuropathy	4 (3.5)	1 (1.9)	3 (4.9)
Papilledema without space occupying lesion	4 (3.5)	4 (7.5)	-
Other optic neuropathy[b]	14 (12.3)	3 (5.7)	11 (18.0)
Disorders of optic chiasm with visual field defects	21 (18.4)		
Pituitary tumor	7 (6.1)	1 (1.9)	6 (9.8)
Parasellar meningioma	9 (7.9)	3 (5.7)	6 (9.8)
Others[c]	5 (4.4)	5 (9.4)	-
Disorders of other visual pathways with visual field defects[d]	9 (7.9)	4 (7.5)	5 (8.2)
Disorders of ocular motility	26 (22.8)	15 (28)	11 (18.0)
Oculomotor (III) nerve palsy only	7 (6.1)	4 (7.5)	3 (4.9)
Abducens (VI) nerve palsy only	6 (5.3)	1 (1.9)	5 (8.2)
Trochlear (IV) nerve palsy only	2 (1.8)	2 (3.8)	-
Myasthenia gravis	3 (2.6)	2 (3.8)	1 (1.6)
Others[e]	8 (7.0)	6 (11.3)	2 (3.3)
Abnormal eye movement			
Nystagmus	3 (2.6)	3 (5.7)	-
Disorders of pupils			
Horner syndrome	2 (1.8)	1 (1.9)	1 (1.6)
Disorders of eyelid	32 (28.1)	12 (22.6)	20 (32.8)
Myasthenia gravis	6 (3.5)	2 (3.8)	4 (6.6)
Blepharospasm	5 (4.4)	2 (3.8)	3 (4.9)
Hemifacial spasm	5 (4.4)	-	5 (8.2)
Oculomotor (III) nerve palsy	7 (6.1)	4 (7.5)	3 (4.9)
Facial (VII) nerve palsy	3 (2.6)	1 (1.9)	2 (3.3)
Multiple ocular motor nerve palsies with ptosis	3(2.6)	1(1.9)	2(3.3)
Other neurogenic ptosis[f]	3 (2.6)	2 (3.8)	1(1.6)
Causes of transient visual loss	4 (3.5)	1 (1.9)	3 (4.9)
Carotid artery stenosis	2 (1.8)	-	2 (3.3)
Atrial fibrillation	1 (0.9)	-	1 (1.6)
Migraine with aura	1 (0.9)	1 (1.9)	-

a = Eighteen patients were categorized into more than one group; all patients with oculomotor nerve palsy were categorized into both "Disorders of eyelid" group and "Disorders of ocular motility" group

b = Other optic neuropathy disorders include comprising tumor related compressive optic neuropathy (optic nerve sheath meningioma, optic nerve glioma, lymphoma, carcinoma of nasal cavity, cavernous hemangioma), toxic optic neuropathy, optic nerve hypoplasia, idiopathic orbital apex syndrome, sinusitis related optic neuropathy, and nonspecific optic atrophy

c = Others include tumor related compressive optic chiasmopathy (craniopharyngioma, chordoma, germinoma) and ruptured arteriovenous malformation

d = Others include occipital infarction, thalamic hemorrhage, and intracranial tumor

e = Others include multiple ocular motor nerve palsies, divergence insufficiency, palsy of conjugate gaze, skew deviation, and Miller–Fisher syndrome

f = Others include Miller Fisher syndrome and neurogenic ptosis (unknown etiology)

diagnosed as migraine. By contrast, only 1 case in the present study presented with transient visual loss, which was diagnosed as migraine with aura.

The occurrence of neuro-ophthalmic diseases seems to increase with age. A study in Singapore reported that the incidence was significantly related with an age of more than 40, but without a relationship with gender.[1] Those results are concordant with the findings of the current study.

Decreased vision and diplopia were the two most common presenting symptoms of neuro-ophthalmic diseases in the present study, and this was comparable with the results of a prior report[2]. We also found that ptosis was one of the most common clinical symptoms, being presented by 16.7% of patients.

The five most common, specific neuro-ophthalmic diseases in this study were NAION, optic neuritis, oculomotor nerve palsy, pituitary tumor, and abducens nerve palsy. Their incidence figures are similar to those of a study in Singapore, except for the incidence of pituitary tumors. The Singaporean research found that abducens nerve palsy had the highest rate (1.27 per 100,000 per annum), followed by NAION (1.08 per 100,000), oculomotor nerve palsy (0.91 per 100,000), and optic neuritis (0.83 per 100,000). However, the rate for disorders of the optic chiasm associated with pituitary neoplasm was only 0.30 per 100,000.[1]

The pituitary adenoma cases included in the present study were not only patients who complained of blurry vision but also those who had visual field defects without notable symptoms. Although the incidence of pituitary adenomas in this study may be higher than that in the study in Singapore[1], the true incidence is likely to be much higher. Burrow et al. conducted a post-mortem study of pituitary glands removed from 120 individuals who had no clinical evidence of pituitary tumors; the researchers' analysis revealed that 27% had adenomas.[4]

In the current study, the most common neuro-ophthalmic disease among patients younger than 50 years was optic neuritis, whereas NAION was the most common among patients aged 50 or older. Inflammatory optic neuritis is the most common optic neuropathy among young patients.[5] The incidence of optic neuritis for Asian populations seems to be lower than that for Caucasians, which is consistent with the overall lower prevalence of multiple sclerosis among Asians.[6–9] NAION is the most common cause of acute optic neuropathy in patients older than 50.[10] Although the incidences of NAION among Asians and Caucasians are comparable, they are much higher than those for African-Americans or Hispanics.[1, 11–14]

Our study demonstrated that 40% of patients who presented with decreased vision were blind in the affected eye. The causes of blindness were variable. Although NAION was common, only 1 patient in this study was blind. Several studies have reported that NAION generally presents with a Snellen visual acuity better than 6/60. In the current study, three out of eight patients who were diagnosed as having optic neuritis presented with an initial Snellen visual acuity of less than 3/60 and were classified as having atypical optic neuritis (a visual acuity less than 6/60), which is more common among Asians.[5]

The strengths of this study include its prospective collection of cases and evaluation of various aspects of the diseases. Its limitations include missing data related to children and to diseases involving many departments. The neuro-ophthalmology clinic mainly enrolls adult patients, and thus a proportion of neuro-ophthalmic diseases in children may have been missed. Some neurologic diseases involve several departments (such as brain tumors and strokes involving visual pathways, myasthenia gravis, hemifacial spasm, or blepharospasm) and thus missing are potential cases treated by neurologists or neuro-surgeons. These could have resulted in a potential under-estimation of the incidences.

In conclusion, optic neuropathy and ocular motor palsies are the leading neuro-ophthalmic disorders. The overall incidence of neuro-ophthalmic diseases is variable, depending on the inclusion criteria of each study. Although the overall incidence of neuro-ophthalmic diseases is low, diseases are often related to blindness or life-threatening conditions.

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Conflicts of interest

Drs. Mekhasingharak, Chirapapaisan and Koohasawad have nothing to disclose.

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