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Visual Disturbances as an Early Important Sign of Brain Tumor: A Case Report

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ABSTRACT
Purpose: to raise attention for careful evaluation of ocular signs and symptoms, especially mild visual disturbances, for early detection of brain tumors.
Case Presentation: A 45-year-old woman presented with a one-month history of gradual vision loss in both eyes. There was also a history of headache for over a year before the vision loss symptom appeared. There was no history of trauma, ocular pain, eye redness, or lacrimation. The visual acuity (VA) of both the right and left eyes with the best-corrected visual acuity (BCVA) was 6/30. Confrontation visual field test of both eyes revealed unremarkable results upon examination. The intraocular pressures (IOP) of both eyes were 11 mm Hg. Anterior segment examination of both eyes was within normal limit except for the direct light reflexes were decreased. Relative afferent pupillary defect (RAPD) of both eyes was difficult to assess. Fundoscopy examination of both eyes revealed papilledema. The retinal fields and macula were normal bilaterally. Computerized tomography (CT) scan demonstrated a hyperdense and calcified lesion in the right frontal lobe. The dimensions of the lesion were measured as 69.9 x 52.1 mm. After contrast, the CT scan showed a strongly enhanced lesion with thickening of the right frontal bone. Both of the anterior horns of the lateral ventricle were pressed by the lesion. There was a midline shift to the left by approximately 14 mm. Both of the eyes were within normal limits.
Conclusion: Blurred vision and other visual disturbances are common early symptoms in brain tumors, but diagnosis is not made till very late due to late presentation. Early detection of a brain tumor through ocular signs and symptoms and complete neuro-ophthalmic evaluation can help in early diagnosis and appropriate management of brain tumors.
Keywords: early detection, brain tumor, blurred vision, vision loss, neuro-ophthalmology

INTRODUCTION

A primary brain tumor is one of the most common and important reasons for seeking neurological and ophthalmological consultation worldwide.[1] The clinical signs and symptoms and management of these tumors depend on the site, type, and duration of the tumor.[2] The most important features of clinical presentation in these patients are the progressive nature of their symptoms. The common manifestations of brain tumors include headache, behavior or cognitive change, vomiting, seizure, and visual difficulties.[3]

Typical initial ocular symptoms are progressive loss of vision with or without optic nerve atrophy, visual field defects, and extraocular nerve palsies.[4] About 46.8%–88.6% of patients present with neuro-ophthalmological manifestations.[1,2] Neuro-ophthalmological manifestations may help diagnose brain tumors since the ophthalmologist may be the first point of call for patients with these tumors.[5]

CASE PRESENTATION

A 45-year-old woman presented with a one-month history of gradual vision loss in both eyes. The loss of vision was slowly progressive and she described it as a blurred vision. There was also a history of headache for over a year before the vision loss symptom appeared. There was no history of trauma, ocular pain, eye redness, or lacrimation. There was no significant past ophthalmic, medical, surgical, or drug history.

On ophthalmological examination, the visual acuity (VA) of both the right and left eyes with the best-corrected visual acuity (BCVA) was 6/30. Confrontation visual field test of both eyes revealed unremarkable results upon examination. The intraocular pressures (IOP) of both eyes were 11 mm Hg. Anterior segment examination of both eyes was within normal limits except for the decreased direct light reflexes. Both eyes' relative afferent pupillary defect (RAPD) was difficult to assess. Color testing with the Ishihara plates revealed that both eyes couldn't read any of the plates. The ocular motility of both eyes was within normal limits.

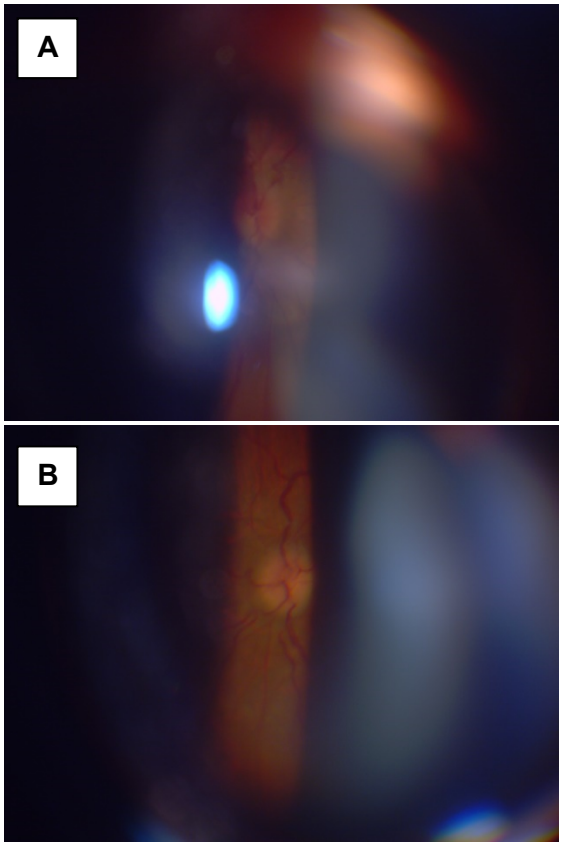

Figure 1. Fundus Photograph (A) Right eye showed blurred optic disc margin (B) Left eye showed blurred optic disc margin

Fundoscopy examination of both eyes revealed papilledema (optic discs with blurred margins, Cup-to-disc (C/D) ratios were difficult to assess and artery-to-vein (A/V) ratios were within normal limit). The retinal fields and macula were normal bilaterally.

The patient was referred to a hospital for computerized tomography (CT) scan examination. The CT scan result demonstrated a hyperdense and calcified lesion in the right frontal lobe. The dimensions of the lesion were measured as 69.9 x 52.1 mm. After contrast, the CT scan showed a strongly enhanced lesion with thickening of the right frontal bone. Both of the anterior horns of the lateral ventricle were pressed by the lesion. There was a midline shift to the left by approximately 14 mm. Both of the eyes were within normal limits.

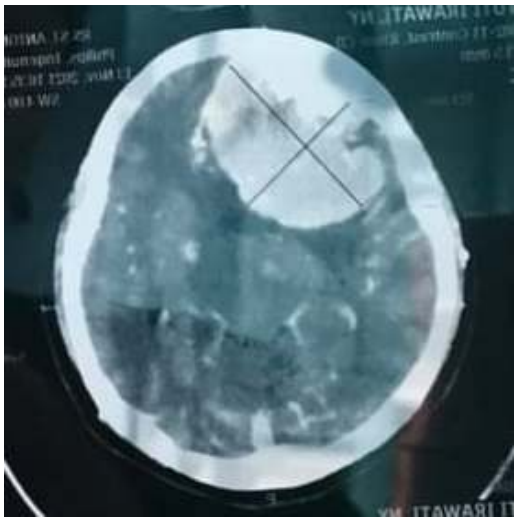

Figure 2. CT Scan showed a hyperdense lesion in the right frontal lobe

DISCUSSION

Blurred vision, one of the commonest presenting symptoms in any eye clinic, is a symptom shared by many other eye diseases. Some physicians 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 a brain tumor, leading possibly to axon damage or even blindness.[6,7] Brain tumors generally cause progressive visual deficits and visual field loss (up to 95%) over weeks to months before the diagnosis. Initial symptoms and signs are often misinterpreted both by the

patients and physicians, and appropriate investigations are consequently delayed.[4]

The present studies showed the most common tumor affecting the visual system are meningioma, pituitary adenoma, and craniopharyngioma.[3,5,7-9] Most of the tumors were detected at the age of the 4th to 5th decade of life.[1,3,9] Brain tumors were previously thought to be more common in males than females but in the present studies the female was more common, the reason came from most of the patients with brain tumor being diagnosed with meningioma with significant female predominance.[1,3,5]

Typical signs and symptoms of a brain tumor include headache, neurological deficits, psychic changes (the patient and his/her relatives are usually unaware of these changes or misjudge them as trivial, especially when they have developed gradually), epileptic attacks, and visual symptoms.[8] Ophthalmic signs and symptoms occur as an initial presentation in up to 50 to 67% of patients diagnosed with primary brain tumors in adults and up to 39 to 43% in children. Children however present with less specific symptoms than adults.[1,2,5,10] The duration of symptoms before presentation ranged from days to years.[4,5,11]

Brain tumors that cause visual symptoms usually do so by compressing portions of the anterior afferent (pregeniculate) visual pathway.[8] Typical ophthalmologic signs and symptoms of brain tumors are blurred vision, optic disc changes (optic atrophy, papilledema), motility disorders (third, fourth and sixth cranial nerves), exophthalmos, visual field defects, loss of color vision (desaturation), and loss of somatic sensation (fifth cranial nerve).[3,8] If the abovementioned signs and symptoms raise the suspicion of a brain tumor, the following tests of visual function are particularly important: the visual acuities of both eyes with the best possible optical correction, testing for a relative afferent pupillary defect, careful perimetry of both eyes, examination of ocular motility, fundus examination with particular attention to the optic discs, comparing one side to the other.[8] If a patient comes in with poor vision in one eye, it is important to perform a visual field examination for both eyes. There may be unsuspected visual field loss indicating an intracranial lesion.[7] Imaging by CT or MRI is mandatory, with the method of choice being the MRI. If the tumor is thought to invade, adhere to, or erode through bony structures, a CT scan can be added. The CT is also helpful when the tumor is associated with the formation of calcific deposits, as is typical for optic nerve sheath meningiomas.[8]

Several studies mentioned the same characteristic of general and ocular signs and symptoms in patients with brain tumors. Headache was the most common general symptom reported. Patients with brain tumors presented with a wide variety of ocular signs and symptoms. Table 1 showed the most common general and ocular signs and symptoms in patients with brain tumors.[1,3-5]

Table 1. Signs and Symptoms of Patients with Brain Tumors

Authors	Signs and symptoms (%)					
	Headache	Visual blur	Impaired colored vision	RAPD	Visual field defect	Abnormal optic disc
Desmukh, et al.	41.17	94.12	23.52	41.17	88.24	11.76 – 47.05
Masaya-Anon & Lorpattanakasem	66.4	88.6	Not mentioned	43.6	80.5	69.7
Sefi-Yurdakul	22.2	61.1	Not mentioned	Not mentioned	66.7	61.1
Tagoe, et al.	77.8	88.3	88.6	34.3	47.1	88.6

The studies showed that visual blur was one of the most common symptoms. Brain tumors can affect patients' vision to the degree of blindness. Most patients presented with VA 6/26 – 2/200 or worse and fell to moderate to severe low vision. Visual field defects were another common ocular sign in patients with brain tumors with hemianopias as the most common type of defect. Masaya-Anon & Lorpattanakasem and Tagoe, et al. mentioned in their studies that bitemporal hemianopia was the most common type of visual field defect presented.[1,3-5]

All the studies mentioned abnormal optic disc appearance in the fundoscopy examination. Optic discs would show pallor, atrophy, or swelling. Desmukh, et al. mentioned optic atrophy at 47.05%, optic disc pallor at 29.41%, and papilledema at 11.76% seen in a total of 17 patients. Masaya-Anon & Lorpattanakasem only mentioned optic disc atrophy and papilledema (52.3% and 16.1% respectively). Sefi-Yurdakul mentioned optic atrophy at 22.2%, optic disc pallor at 11.1%, and optic disc edema at 27.8% seen in a total of 22 eyes out of 18 patients. Tagoe, et al. mentioned optic atrophy at 74.3% and optic disc edema at 25% seen in a total of 36 patients. The patient in this case showed signs and symptoms that were in accordance with previous studies, although there were some examinations that could not be assessed[1,3-5]

A wide variety of clinical presentations might delay diagnosing brain tumors. Quite often brain tumors initially presented with ophthalmic manifestations that need thorough investigation and examination. Clinical history and ocular examinations should be conducted in detail. Ocular examinations such as BCVA measurement, IOP by non-contact tonometry, and dilated fundus examinations should be performed on all patients. Other neuro-ophthalmology examinations should also be conducted on patients with abnormal findings in the examinations mentioned before. Abnormal optic disc findings should be assessed furthermore using optical coherence tomography (OCT) and fundus photographs. Visual field defects can be assessed using Humphrey Visual Field Analyzer Imaging examinations including brain CT and MRI should be ordered for patients with vision loss accompanied by other ocular signs and symptoms because they are essential to determine the diagnosis of brain tumors.[12-14]

CONCLUSION

Ophthalmic clinical features, especially visual disturbances, form a major part of the presentation of patients with a brain tumor. Blurred vision and headache are common early symptoms in brain tumors, but diagnosis is not made till very late due to late presentation. The possibility of brain tumors should be considered in the etiology of visual disturbances before reaching a definitive diagnosis.

Early detection of a brain tumor through ocular signs and symptoms and complete neuro-ophthalmic evaluation can help in early diagnosis and appropriate management of brain tumors.

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