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Case Report

Bilateral gradual cortical blindness due to hemodynamic stroke: A case report ☆,☆☆

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ABSTRACT

Cortical blindness refers to the loss of vision caused by a lesion affecting the geniculate calcarine visual pathway. Bilateral occipital lobe infarctions in the vascular territory of the posterior cerebral arteries are the most common cause of cortical blindness. However, bilateral cortical blindness gradual is rarely reported. Gradual bilateral blindness usually occurs in lesions other than stroke, such as tumors. We report a case of a patient with gradual cortical blindness caused by a nonocclusive stroke caused by hemodynamic compromise. A 54-year-old man diagnosed with bilateral cerebral ischemia after complaining of bilateral gradual vision loss and headache for 1 month. Initially, he only complained of blurred vision with >2/60 vision. However, his visual acuity worsened until he could only see hand movements and only light perception later on (with visual acuity of 1/∼). A computed tomography scan of the head revealed a bilateral occipital infarction, and cerebral angiography revealed multiple stenoses and near-total occlusion of the left vertebral artery ostium, underwent angioplasty and stenting. He has received dual antiplatelet and antihypertensive treatment. He got visual improvement with visual acuity 2/300 after 3 months of the treatment and procedure. Gradual cortical blindness caused by hemodynamic stroke is rare. The most common cause of posterior cerebral arteries infarction is embolism from the heart or vertebrobasilar circulation. With proper management and focusing on treating the etiology of these patients, vision improvements can be obtained in these patients.

Introduction

Cortical blindness refers to the loss of vision caused by a lesion affecting the geniculate calcarine visual pathway [1]. It is also defined as complete loss of vision in the presence of normal pupillary reflexes and without an ophthalmologic cause. Bilateral visual field abnormalities can be observed in most cases of cortical blindness. In contrast, unilateral visual field defects can be caused by lesions of the anterior-most region

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of the calcarine cortex. This cortex is responsible for the contralateral eye's extreme temporal visual field. Both toddlers and adults can be affected by cortical blindness. Traumatic brain injury to the cerebral occipital lobe, congenital occipital lobe anomalies, and prenatal ischemia are common causes [2]. The anterior choroidal artery and thalamo-perforating vessels from the posterior cerebral artery (PCA) supply the optic tract. The PCA mainly supplies the occipital lobe, which is why the most common cause of cortical blindness is bilateral occipital lobe infarction in the PCA vascularity region. PCA infarcts are caused mainly by embolism from the heart but less often by hypoperfusion or hemodynamic stroke [3].

In this case, we suspected hemodynamic stroke as the cause of cortical blindness. Hemodynamic stroke differs from embolic stroke or local vasculopathy. It is an ischemic stroke induced by hypoperfusion that results from regional or systemic origin [4,5].

We report a case of gradual bilateral cortical blindness caused by near-total occlusion of the left vertebral artery (LVA) ostium. Occlusion was followed by mild to moderate multiple stenoses at the intracranial right internal carotid artery (RICA), anterior cerebral artery (ACA), and stenosis at the left carotid artery bulb. All of these processes cause circulatory disturbances. It is a rare case, and here we discuss the best management for our case.

Case report

A 54-year-old man presented with bilateral gradual vision loss and headache 1 month prior and was diagnosed with bilateral cerebral ischemia. For 6 months, the patient complained of blurred vision. Complaints of blurred eyes are getting worse. He also felt dizzy for 4 months, with nausea but no vomiting. There was no slurring of speech, tingling, seizure, or loss of consciousness. Other symptoms were ruled out. The patient also had a history of hypertension and diabetes mellitus, as well as a smoking history. Vital signs were discovered to be expected. This patient's visual acuity was Light positive perception in both eyes, with bidirectional horizontal nystagmus.

Laboratory results showed high blood glucose, high HbA1C levels, and hypertriglyceridemia. A bilateral occipital cerebral infarct was found from a head computed tomography (CT) scan (Fig. 1A). An MRI also showed subacute ischemic cerebral infarction in the right and left cerebellar hemispheres, multiple lesions in the periventricular white matter, basal ganglia, right and left thalamus, and pons contribute to the appearance of Binswanger disease (Fig. 1B).

The patient underwent cerebral angiography with the result being moderate stenosis at the RICA, mild to moderate multiple stenoses at the intracranial RICA and ACA (Figs. 2A and B)., mild stenosis at the left carotid artery bulb, and also near-total occlusion at ostium LVA (Fig. 3A).

One week later, he did angioplasty and stenting procedures. He was given double antiplatelet drugs, namely Acetylsalicylic Acid 100 mg once a day and Clopidogrel 75 mg once a day. For the treatment of diabetes, insulin therapy was given, namely Novorapid 14 IU, 3 times a day. He was also given antihypertensive therapy, namely Amlodipine 10 mg daily and Candesartan 8 mg daily. Atorvastatin is given at 40 mg once daily and neuroprotectant. After 3 months of treatment and procedure, the patient got improvement, with visual acuity of 2/300 in both eyes.

Discussion

Gradual cortical blindness is rare; it primarily describes pathologic vascular conditions. There are no definitive epidemiologic data for the incidence of cortical blindness caused by hemodynamic stroke. However, studies have shown a high incidence of cortical blindness in patients with cerebral stroke in the range of 20%-57% [2].

In this case, a 54-year-old man presented with bilateral gradual vision loss. Visual loss was getting worse in both eyes at the same time. Progressive vision loss due to hemodynamic stroke is more common in the anterior circulation and occurs in 1 eye. Data on hemodynamic stroke caused by stenosis or occlusion of the vertebral arteries is scarce compared to stenosis or occlusion of the carotid artery [6].

Hemodynamic stroke is an ischemic stroke caused by hypoperfusion, not emboli or local vasculopathy [6]. These prolonged hypotension or hypoxia conditions may cause watershed infarcts between the middle and posterior arteries' territories [7].

Cortical blindness is an indicative finding for bilateral occipital lobe ischemia. Intact pupillary light reflexes and normal fundus are key diagnostic elements of cortical blindness, which refers to the posterior visual pathway. Patients usually present with gradual vision loss or may even deny blindness [8]. In this study, our patient reported bilateral blindness occurring gradually. Initially, he only complained of blurred vision with >2/60 vision. However, his visual acuity worsened until he could only see hand movements and only light perception later on (with visual acuity of 1/∼). Typically, the occipital cortex receives blood supply from the middle and posterior cerebral arteries. However, although rare, the most common cause of cortical blindness is occipital lobe ischemia due to occlusion from 1 or both posterior cerebral arteries [7]. This condition is usually caused by emboli, and available literature also showed cases of cortical blindness. One study by Nane and Visalakshi [9] reported cortical blindness in a 61-year-old woman with a left PCA territory infarct, but the patient had improved vision after several months. Another study by Kakaletsis et al. [7] reported bilateral cortical blindness in an 84-year-old man due to a bilateral occipital lobe infarct. The patient had acute bilateral infarction, potentially due to emboli caused by atrial fibrillation. One study by Uysal

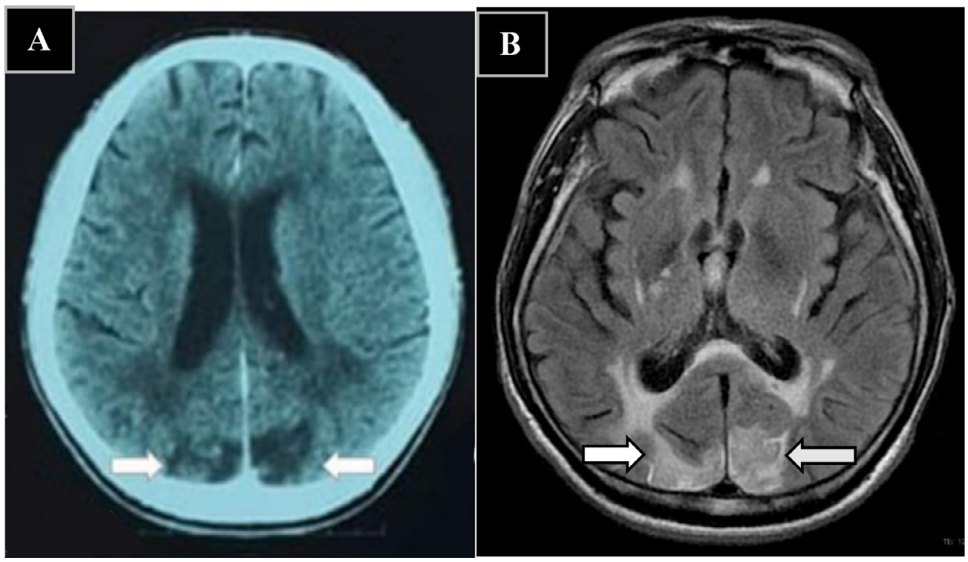

Fig. 1 – (A) Head CT scan without contrast showed bilateral occipital cerebral infarction. (B) Head MRI Fluid attenuated inversion recovery (FLAIR) sequence showed subacute ischemic cerebral infarction in the right and left cerebellar hemispheres, multiple lesions in the periventricular white matter, basal ganglia, right and left thalamus, and pons contribute to the appearance of Binswanger disease. CT, computed tomography.

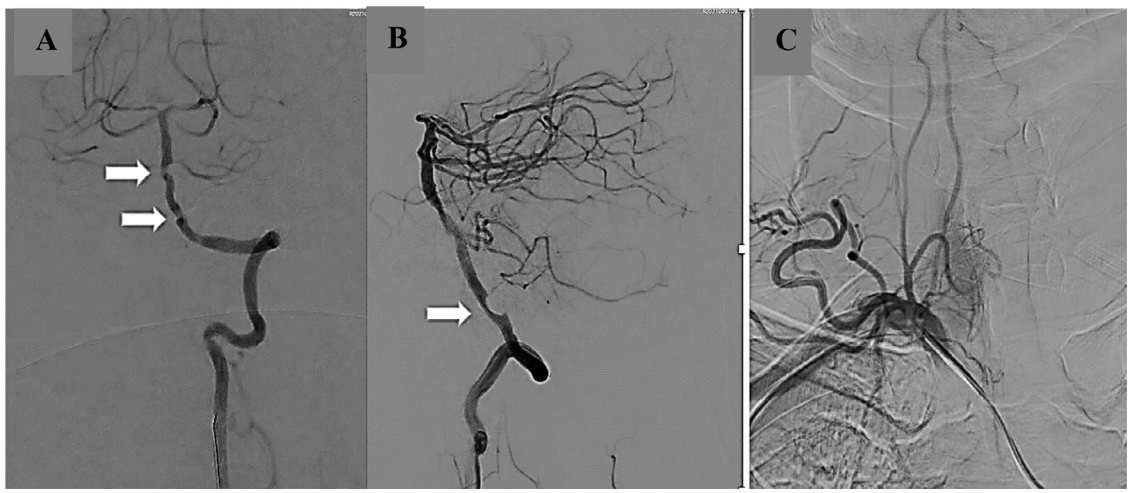

Fig. 2 – (A) and (B) DSA showed mild to moderate multiple stenosis at intracranial RICA. (C) DSA showed hypoplastic right vertebral artery. DSA, digital subtraction angiography; RICA, right internal carotid artery.

et al. [10] reported a 56-year-old woman with bilateral cortical blindness. The patient had a history of ischemic cerebrovascular disease 1 year before, and as in the study by Kakaletsis et al. [7], the patient also had atrial fibrillation. Head MRI and CT scan showed that the patient had the first ischemic stroke in the right visual field and a new ischemic stroke in the left visual field, leading to bilateral cortical blindness [10]. These studies showed that cortical blindness typically occurs due to emboli or in patients with a history of atrial fibrillation. Although our patient had no embolism or atrial fibrillation findings, our study also reported similar symptoms, such as gradual vision loss with blurred vision and a history of cerebral ischemia. On the other hand, gradual bilateral loss of vision may also be caused by lesions other than stroke, such as tumors. One study by Thapa et al. [11] reported progressive and gradual blindness in a 30-year-old man with glioblastoma multiforme. Tumor lesions may cause gradual blindness by compression or infiltration along the visual pathways or visual cortex. Moreover, tumors may also cause chronic papilloedema leading to optic atrophy [11].

We performed various examinations on our patient, including a CT scan of the head and MRI, where bilateral occipital cerebral infarction was found, which we confirmed by digital subtraction angiography (DSA). DSA has a limited morbidity and mortality rate; it is the gold standard for identifying vertebral artery stenosis [12].

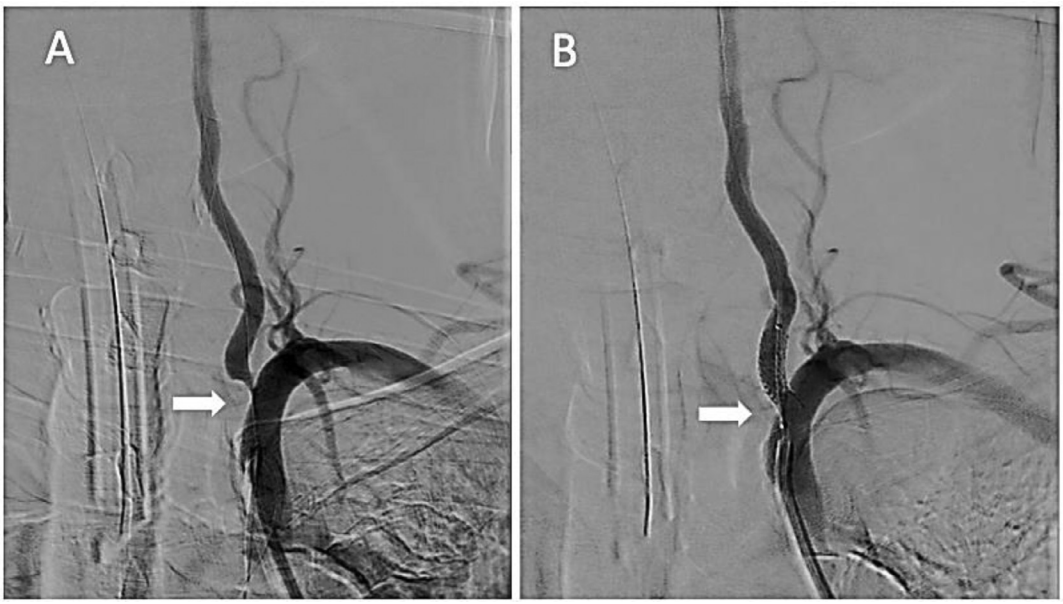

Fig. 3 – (A) Cerebral angiography showed near-total occlusion on ostium left vertebral artery (LVA) and (B) cerebral angiography showed, after ostium LVA stenting and angioplasty, improved occlusion on ostium LVA.

In DSA, we found moderate stenosis at the RICA, mild to moderate multiple stenoses at the intracranial RICA and ACA (Figs. 2A and B), mild stenosis at the left carotid artery bulb, and also near-total occlusion at the ostium LVA (Fig. 3A).

The middle cerebral artery is the most usually damaged blood artery in ischemic stroke, while the bilateral PCA is a very unusual disorder [13]. The anterior choroidal arteries and the thalamo-perforating vessels of the PCA supply the optic tract. The PCA mainly supplies the occipital lobe, which is why the most common cause of cortical blindness is bilateral occipital lobe infarction within the PCA vascularity territory [3,14]. PCA infarcts are primarily produced by embolism from the cardiac, but hypoperfusion or hemodynamic stroke occurs less frequently. We discovered near-total occlusion of the LVA ostium of cerebral angiography in this patient due to hemodynamic stroke, and we determined that was the cause of cortical blindness in this patient.

Cortical blindness is connected with significant morbidity, impairs patients' everyday lives, and has a monetary impact. Patients may be predisposed to falls and fractures [2].

Currently developing a safe and effective therapy for extracranial vertebral artery atherosclerotic stenosis, especially at the vertebral artery origin, namely by using endovascular intervention with percutaneous transluminal angioplasty and stenting [12].

The optimal treatment for patients with cortical blindness includes not only the etiology, in this case, stroke hemodynamics such as stenting procedures, antiplatelet use, and risk factor control, but also rehabilitation and visual training. Restitution treatment, compensatory therapy, and substitution therapy are the 3 primary types of intervention. Restitution therapy is used to repair visual field deficits, compensatory therapy uses saccadic eye movements to compensate for vision loss, and substitution therapy uses prisms or other devices to project visual stimuli from the blind side of the visual field to the normal side [3,15]. In our patient, we gave dual antiplatelet with clopidogrel 1 × 75mg and ASA 1 × 100mg, antihypertensive and a statin for secondary prevention. And we did angioplasty and stenting procedures on the left LVA ostium, where the occlusion appears to be improving (Fig. 3B). After 3 months of routine oral therapy and after angioplasty and stenting procedures, the patient's visual acuity improved from light perception to 2/300. The patient, in our case, is unique since his bilateral cortical blindness occurred gradually from only blurred visions into light perceptions.

Conclusion

Gradual bilateral cortical blindness is rare; it primarily describes pathologic vascular conditions. Therefore, in this case, cortical blindness should be considered a diagnosis for this patient because our patient presented with bilateral visual loss without other neurologic deficits. Where is the cause of cortical blindness, in this case, was PCA nonocclusive stroke as seen from the patented left and right posterior cerebral arteries. The management of this patient is still focused on the etiologic treatment and obtained visual acuity improvements.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Patient consent

Written informed consent for the publication of this case report was obtained from a relative of the patient.

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