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Case Report

Homonymous Hemianopia with Macular Sparing Following Posterior Cerebral Artery Stroke: The Value of Comprehensive Orthoptic Assessment

Ewa Witowska-Jeleń*

Orto-Optica Good Vision Center, Cracow, Poland

***Corresponding Author:** Ewa Witowska-Jeleń, Orto-Optica Good Vision Center, Cracow, Poland.

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Abstract

Posterior cerebral artery (PCA) stroke commonly affects the occipital cortex and frequently presents with homonymous visual field defects despite preserved central visual acuity. Because visual symptoms may occur in isolation, diagnosis may be delayed when routine ophthalmic examination is unremarkable. We report the case of a 35-year-old man who presented with sudden visual disturbance and headache caused by a right PCA ischemic stroke. Best-corrected visual acuity, ocular motility, ocular alignment, and fundus examination were normal, whereas automated perimetry demonstrated left homonymous hemianopia with macular sparing. Comprehensive orthoptic assessment revealed preserved central binocular vision, sensory and motor fusion, and stereopsis despite clinically significant peripheral visual field loss, providing functional information beyond routine ophthalmic examination. This case highlights the diagnostic value of comprehensive orthoptic assessment in patients with occipital stroke and demonstrates that preserved binocular vision and stereopsis should not exclude clinically significant retrochiasmal pathology.

Keywords: *Posterior Cerebral Artery Stroke; Homonymous Hemianopia; Macular Sparing; Orthoptic Assessment; Binocular Vision; Neuro-Ophthalmology*

Abbreviations

PCA: Posterior Cerebral Artery; HH: Homonymous Hemianopia; BCVA: Best-Corrected Visual Acuity; NPC: Near Point of Convergence; AHP: Abnormal Head Posture; OKN: Optokinetic Nystagmus; PCT: Prism Cover Test

Introduction

Stroke remains one of the leading causes of death and disability worldwide, accounting for approximately 6.2 million deaths in 2015 [1]. Posterior cerebral artery (PCA) stroke is a relatively uncommon subtype of ischemic stroke, representing approximately 5% - 10% of all cerebral infarctions [2-5]. Because the occipital lobe contains the primary visual cortex and is predominantly supplied by the PCA, visual disturbances are often the predominant or even the sole presenting manifestation. Homonymous hemianopia is the most common neuro-ophthalmic deficit, although the extent of visual impairment depends on the location and severity of cortical injury [2-5,7].

Unlike anterior circulation strokes, PCA infarctions may occur without motor deficits, speech disturbance, or impaired consciousness, making diagnosis particularly challenging when visual symptoms are subtle or isolated [9]. Patients frequently retain normal visual acuity, normal ocular alignment, full ocular motility, and an unremarkable fundus examination despite significant retrochiasmal pathology.

Furthermore, macular sparing, attributed to dual vascular supply of the cortical macular representation by both the posterior and middle cerebral arteries or to incomplete cortical involvement, may further obscure the severity of visual impairment. Comprehensive orthoptic assessment plays an important role in the multidisciplinary management of patients with neuro-ophthalmic disorders. In addition to identifying visual field defects, it provides detailed evaluation of binocular vision, suppression, sensory and motor fusion, ocular motility, stereopsis, and functional visual performance, thereby complementing routine ophthalmic examination and neuroimaging. However, the role of orthoptic assessment in patients with stroke has received relatively little attention in the ophthalmic literature. This case report presents a patient with left homonymous hemianopia and macular sparing following a right PCA ischemic stroke, demonstrating how comprehensive orthoptic assessment provided clinically relevant functional information beyond routine neurological, radiological, and ophthalmological evaluation.

Case Report

A 35-year-old man presented to the emergency department after awakening with a sudden severe headache accompanied by loss of the left visual field. His medical history was significant for hypercholesterolaemia, and he reported a family history of thrombosis. He denied previous ocular disease, head trauma, or neurological disorders. Neurological examination revealed an alert and fully oriented patient without speech disturbance, motor weakness, sensory deficits, or gait abnormalities. Routine ophthalmological examination showed best-corrected visual acuity of 20/20 in both eyes, full ocular motility, normal pupillary reactions, and unremarkable anterior and posterior segment findings. Magnetic resonance imaging demonstrated an acute ischemic infarction involving the right occipital lobe within the posterior cerebral artery territory. The lesion appeared hyperintense on FLAIR sequences with restricted diffusion and corresponding low signal on the apparent diffusion coefficient map. An additional small ischemic lesion was identified within the right thalamus.

Computed tomography confirmed a focal hypodense lesion in the right occipital lobe without evidence of intracranial haemorrhage or mass effect, establishing the diagnosis of right posterior cerebral artery ischemic stroke. Automated static perimetry demonstrated a left HH with macular sparing, corresponding to the right occipital infarction (Figure 1). Despite the extensive visual field defect, central visual acuity remained normal in both eyes.

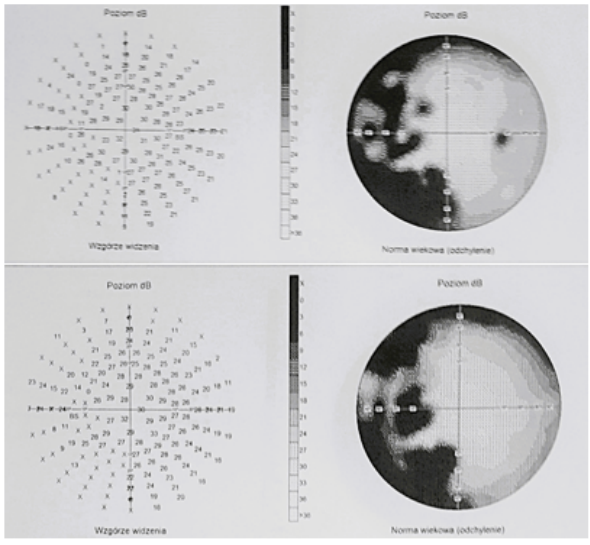


Figure 1: *Results of automated static perimetry.*

One month after the stroke, the patient underwent a comprehensive orthoptic assessment, including synoptophore examination (Figure 2). Two pairs of fusion targets were intentionally used to assess fusion: large peripheral targets subtending 10° and smaller macular targets subtending 3°. Due to the visual field defect, the patient was unable to achieve fusion with the larger R1 and R2 cat targets and suppressed the peripheral images. In contrast, fusion was successfully achieved with the smaller R5 and R6 targets, with a fusional range of 4° in convergence and 3° in divergence.

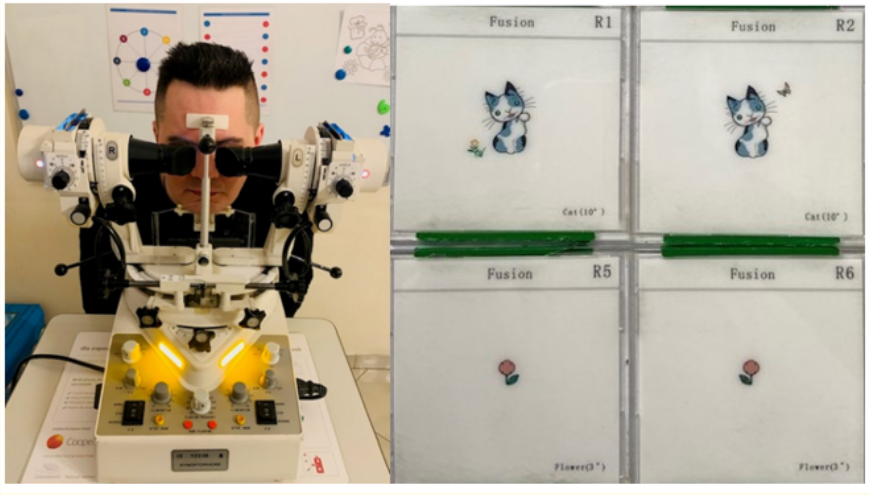


Figure 2: *Synoptophore examination with the targets used for fusion assessment.*

Ocular alignment, pupillary reactions, and ocular motility were normal, with no evidence of ocular motor cranial nerve involvement. The patient reported peripheral disappearance of optotypes during visual acuity testing despite preserved central visual acuity. Assessment of binocular visual function demonstrated preserved sensory and motor fusion, normal simultaneous perception, measurable stereopsis at both distance and near, and a small exophoria at distance and near fixation. Synoptophore examination confirmed preserved central fusion but revealed progressive peripheral fading of the fusion target in the temporal and inferior visual fields, consistent with the patient's homonymous visual field defect. Confrontation visual field testing also confirmed left homonymous hemianopia with macular sparing. The results of the selected orthoptic assessments are summarized in table 1.

Assessment	Findings
BCVA	**Distance:** right eye 20/20 (-2 letters), left eye 20/20 (-2 letters) **Near:** right eye Snellen 0.5, left eye Snellen 0.5
Subjective visual symptoms	Peripheral disappearance of optotypes during visual acuity testing
Ocular motility	Full and smooth ocular motility in all nine positions of gaze
NPC	6 cm
AHP	Absent
OKN	Present
PCT	**Distance:** 12Δ exophoria; **Near:** 14Δ exophoria
Sensory status	Worth four-dot test: fusion (4 lights perceived)
Synoptophore	Objective angle: 0°. Subjective angle: 0°. Peripheral fusion targets (10°): absent. Macular fusion targets (3°): present. Stereopsis: present.
Stereopsis	**Distance:** Present; **Near:** Present TNO: 120 arcsec, Lang I: 400 arcsec
Confrontation visual fields	Left homonymous hemianopia with macular sparing

Table 1: *Selected results of the orthoptic examination.*

Overall, the orthoptic findings demonstrated preserved central binocular visual function despite a clinically significant retrochiasmal visual field defect. The absence of ocular motor abnormalities together with preserved sensory and motor fusion supported cortical visual pathway involvement rather than ocular motor dysfunction. The patient was referred for multidisciplinary neurological and orthoptic follow-up. Serial orthoptic assessments were performed to monitor binocular visual function, stereopsis, suppression, and adaptation to the persistent homonymous visual field defect.

Discussion

Posterior cerebral artery stroke remains an uncommon subtype of ischemic stroke, accounting for approximately 5% - 10% of cerebral infarctions [2-5]. Although relatively rare, its reported incidence has increased by 10% - 26% in recent years [6]. The occipital lobe is the brain region most affected, explaining why visual symptoms are frequently the predominant clinical manifestation [7].

Visual impairment develops in nearly three-quarters of patients following PCA stroke, with homonymous visual field defects representing the most common neuro-ophthalmic finding [8,9]. Left homonymous hemianopia has been reported more frequently than right-sided defects, consistent with the presentation observed in our patient [1]. In the clinical series reported by Benke., *et al*. visual field defects were present in 64.3% of patients, whereas motor symptoms occurred in only 30%, sensory disturbances in 30%, impaired consciousness or dizziness in 11.9%, cognitive deficits in 7%, oculomotor abnormalities including diplopia and strabismus in 7.1%, and ataxia in 4.8% [1,6]. These findings illustrate that visual symptoms may dominate the clinical presentation and occasionally represent the only obvious manifestation of stroke. Beyond visual field loss, PCA infarction may also result in higher-order cortical dysfunction, including executive impairment and visuospatial neglect, both of which may further compromise functional vision and rehabilitation outcomes [10]. Our patient demonstrated a characteristic left homonymous hemianopia with macular sparing following right occipital infarction. Preservation of central vision despite a substantial visual field defect is a well-recognized consequence of occipital lesions and is generally attributed to dual vascular supply of the cortical macular representation by both the posterior and middle cerebral arteries or to incomplete involvement of the primary visual cortex [11]. Consequently, preserved visual acuity should never exclude significant retrochiasmal pathology. The principal message of this report concerns the functional significance of comprehensive orthoptic assessment. Although neuroimaging established the diagnosis and automated perimetry identified the visual field defect, orthoptic examination provided additional clinically relevant information regarding binocular vision, suppression, sensory and motor fusion, stereopsis, and ocular motility. Despite a clinically significant homonymous hemianopia, central binocular vision and stereopsis were preserved, most likely because macular sparing maintained the central binocular visual field. The preservation of central sensory and motor fusion despite loss of peripheral fusion reflected cortical disruption of peripheral binocular visual processing rather than ocular motor dysfunction. These findings could not have been obtained from routine ophthalmic examination or automated perimetry alone and may have important implications for functional assessment and rehabilitation planning. Orthoptists are increasingly involved in the assessment and rehabilitation of patients with acquired neurological visual disorders. Detailed evaluation of binocular vision, suppression, stereopsis, ocular motility, and adaptive visual strategies enables monitoring of recovery, identification of compensatory mechanisms, and selection of appropriate rehabilitation, including prism therapy, visual scanning training, and neuro-orthoptic rehabilitation where indicated. This interdisciplinary role extends beyond diagnosis to include functional monitoring throughout rehabilitation. Recent stroke rehabilitation guidelines also emphasise multidisciplinary management involving vision specialists to optimise functional outcomes [12,13].

This report has several limitations. It describes a single patient and therefore does not permit generalization of the findings. In addition, long-term quantitative changes in binocular visual function were not available.

Nevertheless, this case demonstrates that comprehensive orthoptic assessment complements neurological, radiological, and ophthalmological investigations by providing functional information that cannot be derived from visual acuity testing, ocular motility assessment, or perimetry alone. Preservation of binocular vision and stereopsis should not be interpreted as evidence against clinically significant retrochiasmal visual field loss in patients with PCA stroke.

Conclusion

Posterior cerebral artery stroke may present with preserved visual acuity despite clinically significant homonymous visual field defects resulting from macular sparing. Preservation of the central visual field may also maintain central binocular vision, sensory and motor fusion, and stereopsis despite substantial peripheral visual field loss. Therefore, normal visual acuity, preserved stereopsis, and apparently intact binocular vision should not exclude clinically significant retrochiasmal pathology. This case highlights the complementary role of comprehensive orthoptic assessment in patients with occipital stroke. Beyond visual acuity testing and automated perimetry, orthoptic examination provides valuable functional information regarding binocular vision, fusion, suppression, and stereopsis that may influence diagnosis, rehabilitation planning, and long-term follow-up.

Conflict of Interests

The author declares no conflict of interest.

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