Neurological Hemifield Test in Binasal Defects

We read with great interest the paper by McCoy et al. validating the neurological hemifield test (NHT) to detect and classify visual field loss caused by chiasmal or postchiasmal lesions. In this paper, more than 60% of glaucoma eyes misclassified as neurological according to the NHT score criterion had binasal defects. Therefore, interpreting binasal hemianopia is a particular challenge. To emphasize that point, we describe two patients presenting with a similar binasal hemianopia pattern but different topographical location and etiology. In both clinical cases the NHT was above the score 30 suggesting a chiasmal or retrochiasmal neurological injury.

Case 1: A 73-year-old man was referred to neuro-ophthalmologic department with a complaint of progressive right visual loss. Best-corrected visual acuity was 0.25 in the right eye (RE) and 1.0 in the left eye (LE). A right relative afferent pupil defect (RAPD) was observed. The RE funduscopy showed a temporal optic disc pallor. Left optic disc was normal. Visual field testing revealed a binasal hemanopia pattern. The NHT score was 36 and 78 in the RE and LE, respectively. Magnetic resonance imaging (MRI) demonstrated an elongation of the right supraclinoid internal carotid artery that compressed right optic nerve and chiasm with right optic disc atrophy associated (Fig. 1). The patient was surgically treated. Microvascular decompression of the right internal carotid artery was performed via supraciliary craniotomy (Fig. 2).

Case 2: A 47-year-old man with myopia diagnosed of normal-tension glaucoma and treated with hypotensive medical therapy for 3 years was referred to study by bilateral progressive visual field loss. No relative afferent pupillary defect was present. Funduscopy revealed bilateral cupping of the optic disc. Visual field testing showed a binasal hemianopia defect (Fig. 3) with a NHT score of 70 in RE and 74 in LE, so that MRI was performed with attention directed toward the chiasm showing no significant alteration.

Although occasionally neurological diseases can give binasal defects such as, bilateral internal carotid artery aneurysms, olfactory groove meningioma, primary empty sella, elevated intracranial pressure, neurosyphilis and dolichoectatic, or atherosclerotic carotid arteries as in the clinical case 1, glaucoma is the overwhelmingly dominant reason for such defects. Other ocular causes include bilateral ischemic optic neuropathy, optic nerve head drusen, optic nerve pits, retinitis pigmentosa, or keratoconus.

Figure 1. (A) Binasal hemanopia with a NHT above 30 in both eyes. (B) Funduscopy revealed temporal pallor in right optic disc. (C, D) Axial (C) and coronal (D) T2-weighted MRI studies showed an elongation of the right supraclinoid internal carotid artery (yellow arrows) that laterally compresses right optic nerve with optic nerve atrophy (orange asterisk) and signal change associated (red arrow).

Figure 2. (A, B) Right optic nerve (ON) and chiasm (*) are laterally compressed by a severe atherosclerotic supraclinoid internal carotid artery (ICA, [C]). (C) Microvascular decompression was performed. Two pieces of teflon are placed between the ICA and the optic nerve and between the ICA and the chiasm to keep them apart (black arrow).
McCoy et al.\(^1\) found 75% sensitivity and 98% specificity for a NHT score of 70. Despite that, the clinical case 2 had a NHT score equal or above 70 in both eyes and no neurological disease was present. Therefore, not only visual field algorithms, but also an individualized valuation will assist us to reach a successful diagnosis in doubtful cases, mainly in infrequent cases of binasal hemianopia.

A careful and detailed evaluation by a trained ophthalmologist is essential to reach an accurate diagnosis. Although the NHT\(^5\) is a useful tool for an initial cautious approach in patients whose visual field defects may be suspected of being caused by neurological disease, other clinical features including optic disc pallor, cupping, and RAPD presence are helpful in order to establish the origin of the disease. However, an MRI will provide the definitive diagnosis.

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Figure 3. A 47-year-old man with bilateral OAG under medical treatment. (A) Binasal hemianopia with a NHT score of 70 RE and 74 LE. (B) Funduscopy revealed a vertical cupping in both optic nerves. Magnetic resonance imaging was otherwise normal.