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Sir,

Use of blue-on-yellow perimetry for detection of sectoranopia

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Each sector of the lateral geniculate body corresponds with a sector of visual field.¹ A lesion of the lateral geniculate body can produce a wedge-shaped visual field defect, which is called sectoranopia. The territory of the lateral choroidal artery covers a horizontal area. Visual field defects are commonly demonstrated by conventional Goldmann perimetry and automated perimetry.^{2,3} We examined a woman with homonymous horizontal sectoranopia with a new method, blue-on-

yellow perimetry. The lesion she had was thought to be in the lateral geniculate body.

Case report

A 49-year-old woman experienced sudden left haemianopia. Magnetic resonance imaging (MRI) demonstrated no lesion on that day. After 1 month, the MRI heavily T2 weighted image (black and white

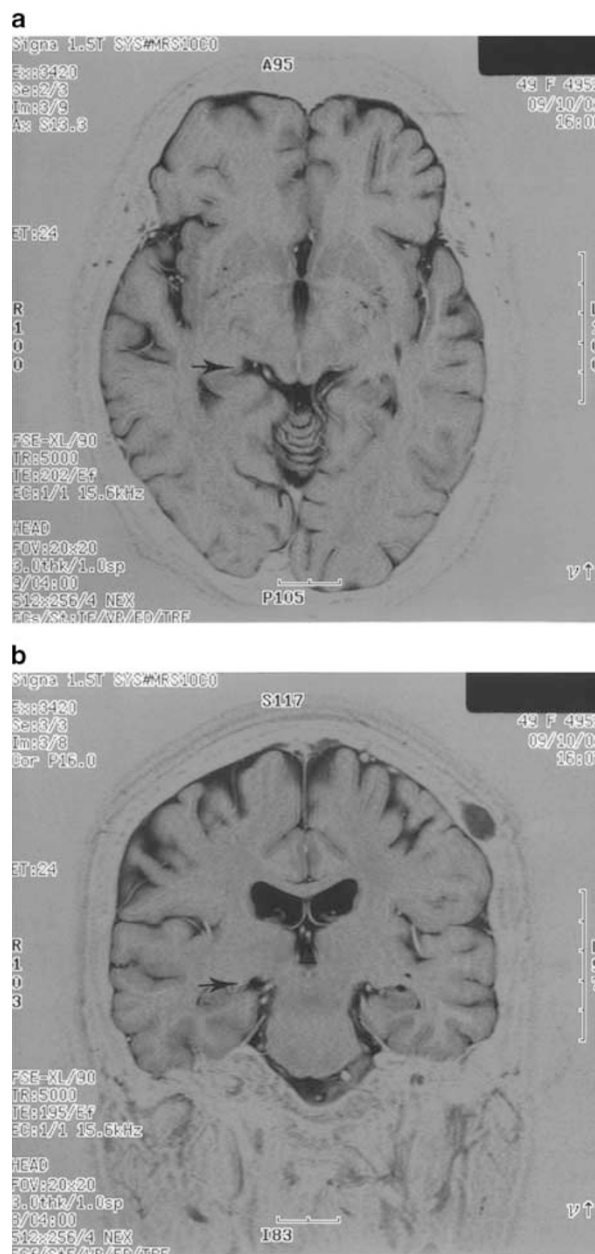


Figure 1 MRI heavily T2 weighted image (reverse image) demonstrates low intensity (arrowhead) around the right lateral geniculate body: (a) transverse image, (b) coronal image.

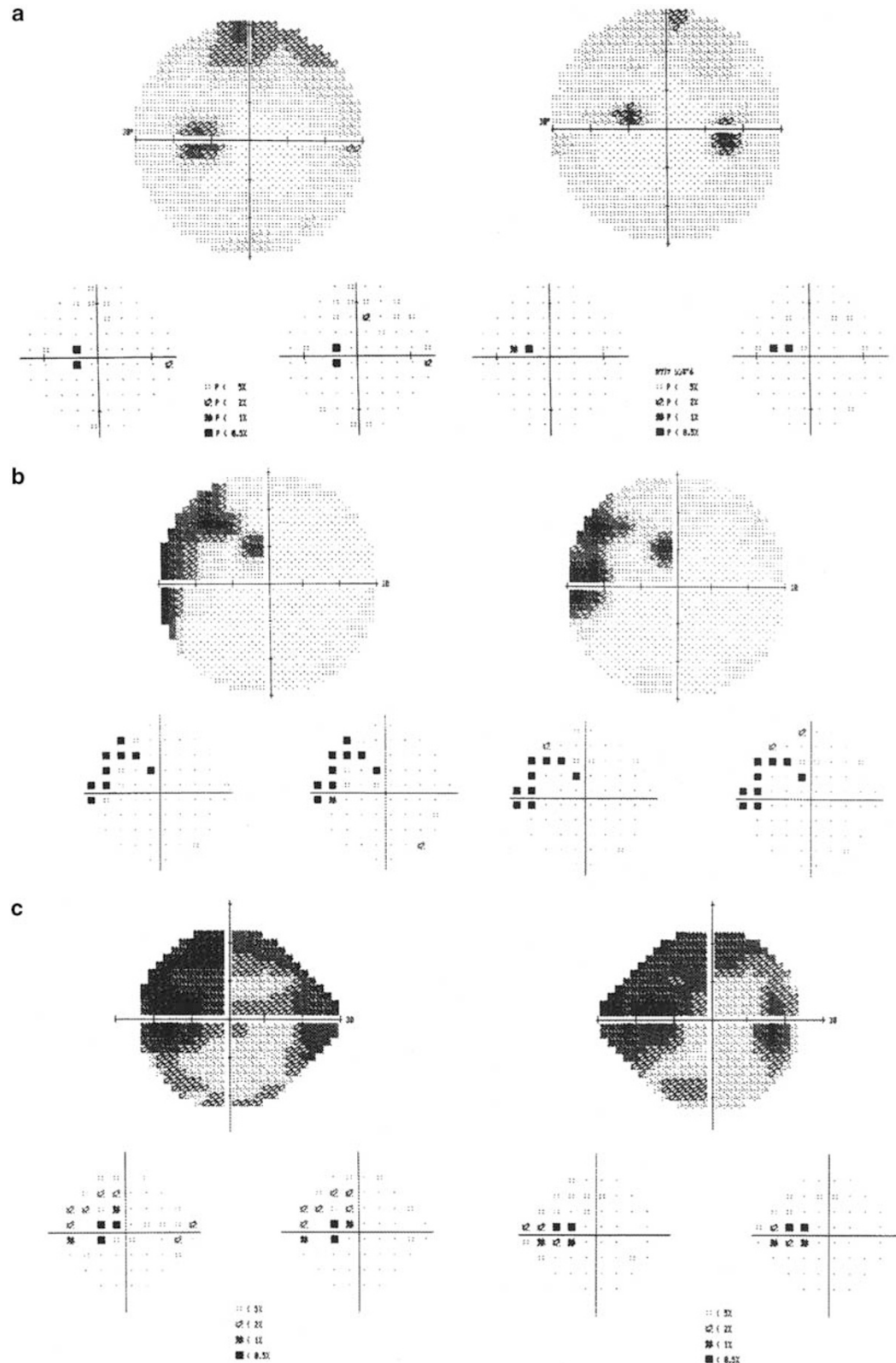


Figure 2 (a) Conventional white-on-white perimetry 30-2 demonstrates (lower) left bilateral scotomas in the left field at an eccentricity of about 10° and just superior to the horizontal line in both eyes. (b) White-on-white perimetry program 10-2 shows an additional small scotoma just superior (3°) to fixation on the left side of the vertical midline. (c) Blue-on-yellow perimetry program 24-2 reveals left typical incongruous homonymous horizontal sectoranopia on total and pattern deviation maps (lower).

reverse image) demonstrated low intensity around the lateral geniculate body (Figure 1). The patient came to our department for an examination of the visual pathway after a second MRI was performed. Both fundi appeared normal, and intraocular pressure was within normal limits in both eyes. She had visual acuity of 1.5 bilaterally. Upper quadrantanopia of the inner isopter in the left eye and normal visual field in the right eye by Goldmann manual perimetry. The Humphrey field analyzer (Model 750, Humphrey-Carl Zeiss, Dublin, CA, USA) white-on-white perimetry program central 30-2 (76 points at 6° grid within a 30° visual field) showed left bilateral scotomas in the patient's left visual field at an eccentricity of about 10° and just superior to the horizontal midline in both eyes (Figure 2a). Humphrey white-on-white perimetry program central 10-2 (68 points within a 10° visual field) showed an additional small scotoma just superior (3°) to fixation on the left side of the vertical midline (Figure 2b). A blue-on-yellow perimetry program central 24-2 (54 points at 6° grid within a 30° visual field) revealed left typical incongruous homonymous horizontal sectoranopia (Figure 2c). After 1 month, blue-on-yellow perimetry produced the same results. The patient was diagnosed as having an infarction of the right lateral geniculate body, based on her sectoranopia and clinical course. The pattern of visual field defects was an infarction of the territory of the lateral choroidal artery.

Comment

Blue-on-yellow perimetry has been developed to detect early glaucomatous visual field loss.^{4,5} Initial glaucomatous damage is correlated with blue cone-mediated retinal ganglion cells. Blue cones are sparsely spread on the retina. If these few retinal ganglion cells are damaged, redundancy is small. The visual field loss seen on blue-on-yellow perimetry is larger than that on white-on-white perimetry. The same mechanism is thought to occur in the optic pathway behind the optic nerve. Another possible mechanism for this damage is selective retinal ganglion cell loss. Koniocellular cells in the lateral geniculate body are thought to correlate with blue-on-yellow pathway⁶ and could be selectively damaged in the described patients. It is difficult to see selective loss in the layer of the lateral geniculate body on MRI. Another mechanism for this damage might simply be characterized by different scaling factors between perimetries in the Humphrey software. Keltner and Johnson⁷ reported on one patient with haemianopia using blue-on-yellow perimetry. We also described a patient with quadrantanopia due to a lesion in Meyer's loop using blue-on-yellow perimetry.⁸

Conversely, the results of white-on-white perimetry also have been important to demonstrate a sign of a lesion of the lateral geniculate body. Haemianopic isolate scotomas on the horizontal line due to a lesion in the lateral geniculate body have not been reported, however, to our knowledge. The area of infarction might be small or the degree of infarction might be slight. Program central 10-2 more clearly depicted the left homonymous visual field defects centrally than did the central 30-2 program.

Blue-on-yellow perimetry tended to show abnormalities in the upper field.⁹ Our patient seemed to exhibit quadrantanopia on a grey scale Figure 2c, upper), but horizontal sectoranopia was observed on total and pattern deviation maps (Figure 2c, lower). An upper field defect on a grey scale of blue-on-yellow perimetry also has been found in normal subjects.

When an MRI study reveals a lesion in the optic pathway, blue-on-yellow perimetry would be useful to show the visual field defects reflecting the lesion that cannot be found by conventional white-on-white perimetry.

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