Clinically detectable visual field loss

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Visual field defects can be a sign of ophthalmic or neurological disease. The area of the visual field affected can help localise the lesion and suggest likely diagnoses. Clinical assessment to identify the basic type of field defect and any associated systemic symptoms will assist GPs in determining the urgency of referral and deciding between ophthalmic or neurological referral.

The average human visual field extends 60 degrees nasally, 90 to 100 degrees laterally and 150 degrees vertically around the central point of vision. The visual fields overlap by approximately 120 degrees, giving stereopsis (depth perception). Visual acuity is sharpest centrally, where the photoreceptors on the retina are closer together, with image resolution and colour perception being reduced in the peripheral visual field.

Visual field problems can be a sign of underlying ophthalmic or neurological disease. Because the retinal ganglion cells travel in a precise anatomical location from the retina to the lateral geniculate nucleus, and the relative positions of the axons are preserved in the optic radiations from this nucleus to the occipital cortex, it is possible to localise abnormalities based on assessment of the visual field (Figure 1).

The GP's role in patients with visual field problems is to conduct a clinical assessment with the aim of identifying the basic type of field defect and any associated systemic symptoms. The urgency of referral and the decision to refer to a neurologist or ophthalmologist depend on the symptoms, signs and potential underlying pathology.

How do patients present?

Typically, patients with visual field loss are not aware of any alteration in their peripheral vision unless their central vision is affected. However, family members often comment that the patient seems to have a problem with their peripheral vision, for example not noticing when they are being passed the salt shaker at the table. Additionally, there may be a history of bumping into objects or people on the street. One of my patients complained that he would lose sight of the cursor on his computer screen whenever he tried to perform an action in the bottom left of the screen.

When patients notice a problem with their visual field on one side, they often misinterpret it as a problem with the eye on that side of the body. For example, a patient may interpret a problem with the right visual field as being a problem with their right eye.

When patients lose vision in one eye they may notice:

- nothing at all
- loss of depth perception
- a reduction in visual acuity with both eyes open that is worse when closing one eye but better when closing the other.

If patients have lost one half of their visual field in both eyes, they may report that they:

- see only half of their face in the mirror
- miss half of the visual scene, which is particularly a problem when driving
- miss the end or beginning of sentences or words when they read.

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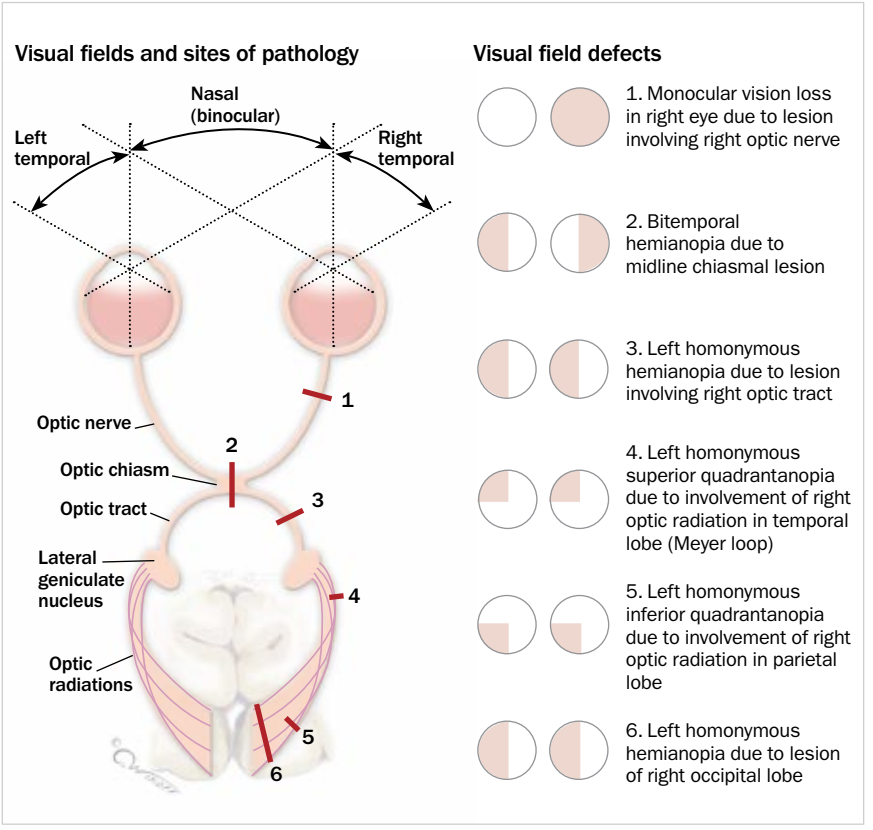

Figure 1. Relation between sites of pathology (numbered 1 to 6) and visual field defects.

Occasionally a visual field problem is detected by an optometrist on routine screening. In that case, a print-out of the results would hopefully be provided to their doctor.

Clinical assessment

In patients with suspected visual field loss, visual acuity should be checked first, preferably using a wall-mounted chart. Assuming that the patient has reasonable vision in each eye then visual fields can be tested as follows.

- Sit directly opposite the patient with your eye level with theirs, about one metre apart.
- Ask the patient to cover one eye and cover your own eye, so you are looking directly at them with the opposite eye.
- Using your hand positioned halfway between your faces, check whether the patient can 'count fingers' in the four quadrants of the visual field. It is best to use one, two or five fingers (three and four are easily confused).
- Be sure to check above and below the horizontal midline, and either side of the vertical midline.

More detailed clinical testing is possible (e.g. using an object such as a red hatpin instead of fingers). However, if a visual field defect is suspected then it is advisable to refer the patient to an ophthalmologist or optometrist for formal automated visual field assessment.

Localising the lesion

The area of the visual field that is affected can help identify the site of the lesion and suggest likely diagnoses.

Monocular defect

If there is a visual field defect in one eye only then the problem must be anterior to the optic chiasm, in the retina or optic nerve (Figure 2). An ophthalmic consultation is the best first step.

Enlarged blind spot

The patient may complain that they are aware of a spot missing in their temporal field of vision in one or both eyes. This pattern can occur from either ophthalmic disease or neurological conditions.

Ophthalmic causes of an enlarged blind spot include:

- peripapillary atrophy – often in very short-sighted people
- acute idiopathic big blind spot syndrome.

Neurological causes of an enlarged blind spot include:

- raised intracranial pressure, which may also cause headache and pulsatile tinnitus.

Peripheral constriction

Peripheral field constriction can occur in both ophthalmic disease and neurological conditions. Ophthalmic causes of peripheral field constriction include the following:

- glaucoma – usually asymptomatic
- retinal dystrophy – with associated night blindness and sensitivity to bright light.

Neurological causes of peripheral field constriction include:

- raised intracranial pressure – which may also be associated with headache and pulsatile tinnitus
- perineuritis – an inflammatory eye disease associated with pain and redness.

Bitemporal hemianopia

If there is loss of the temporal visual field in both eyes then pathology involving the optic chiasm must be considered (Figure 3). Possible causes include:

- pituitary adenoma
- craniopharyngioma
- parasellar meningioma.

MRI with dedicated pituitary views is recommended.

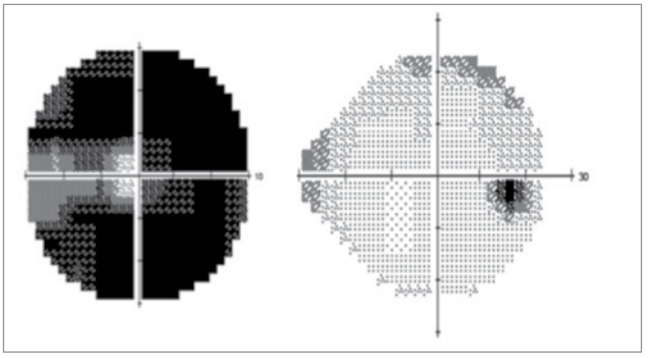

Figure 2. Left monocular visual field loss due an optic nerve sheath meningioma.

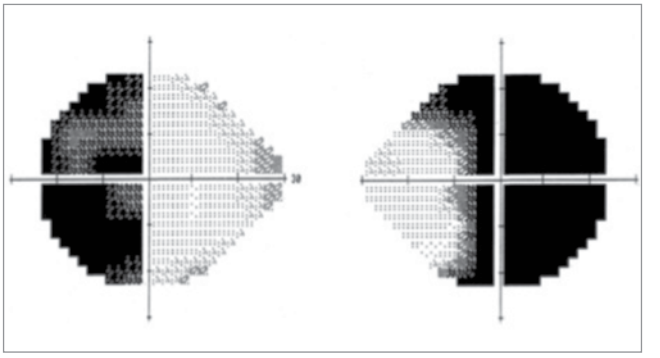

Figure 3. Bitemporal hemianopia caused by a pituitary tumour compressing the optic chiasm.

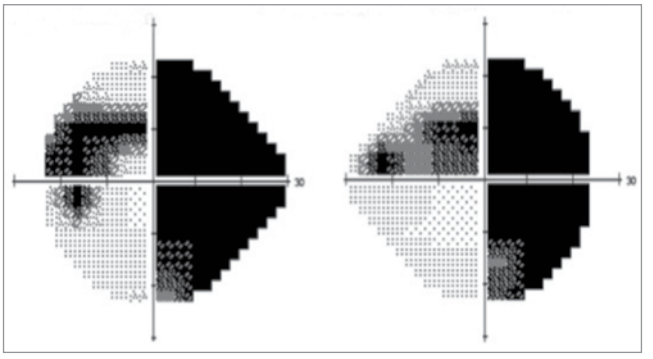

Figure 4. Right homonymous hemianopia from embolic stroke, with additional left superior quadrantanopia.

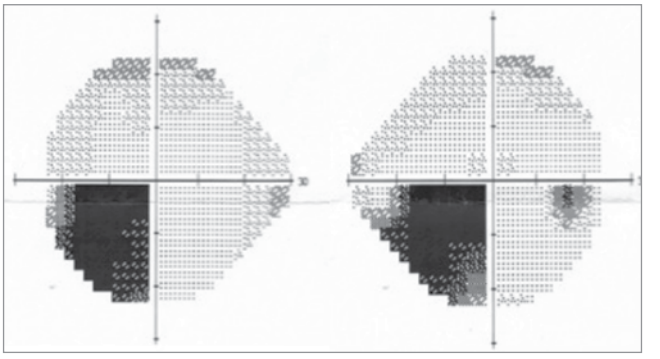

Figure 5. Left inferior quadrantanopia due to metastatic lesion to the right posterior parietal optic radiations.

Homonymous hemianopia

If the defect is on the same side in each eye then the lesion is in the contralateral postchiasmal optic pathways (Figure 4). Possible locations of the lesion include:

- optic tract
- lateral geniculate nucleus – typically causes a sectoral defect
- temporal lobe (Meyer loop) – causes superior quadrantanopia
- parietal lobe – causes inferior quadrantanopia (Figure 5)
- occipital lobe – may be macular sparing.

MRI with views of the optic radiations is recommended. The most likely type of lesion depends on the patient's age:

- primary brain tumour or arteriovenous malformation in younger patients
- multiple sclerosis in patients in their 20s or 30s
- a stroke or a metastatic lesion in older patients.

In patients with homonymous hemianopia it is worth requesting a formal visual field and ophthalmic assessment to confirm your clinical suspicions. However, if you suspect a central lesion do not delay neuroimaging.

Conclusions

Visual field problems can be a sign of underlying ophthalmic or neurological disease. GPs can assess the clinical history, the basic visual field defect, visual acuity and other systemic problems. This should help guide the urgency of referral and the choice between ophthalmology or neurology referral. If there is any uncertainty about the patient's visual acuity or field defect, then formal ophthalmic assessment may help expedite the decision whether to test further or to refer to a neurologist.

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Further reading

Pane A, Burdon M, Miller NR. The neuro-ophthalmology survival guide. Edinburgh, New York: Elsevier; 2007.

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