



PRACTICE

RATIONAL TESTING

Blurred vision

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What you need to know

- "Blurred vision" is synonymous with several different visual disturbances and must be further defined
- A careful history and examination will often reveal the most likely underlying pathology. Pinhole occluders are a cheap, quick, office-based test that can reveal an underlying refractive error during evaluation by a general practitioner
- New cases of blurred vision will likely need assessment by an optometrist or ophthalmologist. The urgency of referral depends on the history and examination findings
- It is important to have an understanding of local service provision and referral pathways to allow efficient use of services and provide a direct patient journey

Blurred vision is a broad term that patients might use to describe a multitude of ophthalmic complaints, and therefore requires careful questioning to guide evaluation. Blurred vision is a loss of clarity or sharpness of vision. It is important to differentiate blurred vision due to refractive error (the commonest reason globally¹) from other symptoms that may be inaccurately described as blurred vision, such as scotomata (visual field defects), diplopia (double vision), floaters, photopsia (flashes), and metamorphopsia (visual distortions).

This rational testing article provides some pointers for effective history taking and examination in order to guide appropriate next investigations and onward referrals.

Sources and selection criteria

This article was created using a combination of expert advice (both ophthalmologists and general practitioners), established literature, and a Medline literature search. Blurred vision is a broad topic with several potential differentials, and as such there is no Cochrane systematic review. We used well regarded resources from standard ophthalmic textbooks to recent peer reviewed literature on loss of vision.

Our Medline search used terms "blurred vision" and "loss of vision" primarily. The search was last carried out in November 2019.

Throughout our review of resources, we selected learning points that would most benefit readers in helping narrow down the differentials in what can be a difficult presentation, and we highlighted the signs and symptoms that should prompt urgent referral or treatment.

How should I assess the patient?

Diagnostically, much can be achieved with a careful history and basic examination in primary care. The key elements of a history are the pattern of blurred vision, associated symptoms, and ophthalmic and medical history. Key questions are detailed in [box 1](#).

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This series of occasional articles provides an update on the best use of key diagnostic tests in the initial investigation of common or important clinical presentations. The series advisers are Steve Atkin, head of School of Postgraduate Studies and Research, RCSI-Bahrain; and Eric Kilpatrick, Division Chief, Clinical Chemistry, Sidra Medical and Research Center, Qatar; honorary professor, department of clinical biochemistry, Hull Royal Infirmary, Hull York Medical School. You can read more about how to prepare and submit an Education article on our Instructions for Authors pages: <https://www.bmj.com/about-bmj/resources-authors/article-types>.

Box 1: Taking a history for blurred vision^{2,3}

Ask about:

- Pattern of blurred vision:
 - Sudden or gradual onset?
 - How long has the vision been blurred?
 - Does it affect one or both eyes? Those with unilateral symptoms may present later in the disease process if they have compensated with good vision from the contralateral eye
- Associated visual symptoms:
 - Any floaters or flashes? Are they new or persistent?
 - Any visual “curtain” effects (such as the sensation of a black curtain coming down across the field of vision in one eye)?
 - Any visual distortion? Does it affect their central vision?
 - Does the blurred vision improve with blinking?
- Other associated symptoms:
 - Pain? If so, how severe is the pain? Any associated nausea or vomiting? Any pain on eye movement? Sharp pain or a sensation of something in the eye? Any recent trauma?
 - Any headache? If so, is it temporal? Any scalp tenderness? Any jaw claudication (pain in jaw after chewing for some time)?
 - Any redness?
 - Any discharge?
- Medical history—Blurred vision may be a manifestation of a systemic disease, commonly diabetes and hypertension, but autoimmune diseases (including seronegative arthropathies) can also result in ophthalmic manifestations such as uveitis
- Ophthalmic history:
 - Any contact lens use?
 - Any recent surgery or intra-vitreous injections?
 - Any history of amblyopia (lazy eye)?
- Social history—The patient’s occupation may expose them to a high risk of foreign body injuries
- Family history of eye disorders such as glaucoma and hereditary disease such as retinitis pigmentosa will also help to estimate patients’ risk and prognosis of these conditions

Typically, blurry vision of sudden onset that is painful and unilateral raises concern for an ophthalmic emergency and warrants immediate ophthalmologic referral. In contrast, gradual onset, bilateral, painless blurred vision is more often related to conditions such as refractive error or cataracts and can be referred less urgently. Stable floaters may suggest a posterior vitreous detachment, whereas a shower of new floaters, persistent flashing lights with associated “visual curtain” effects (such as the sensation of a black curtain coming down across the field of vision in one eye) is concerning for retinal detachment. [Box 2](#) summarises the differential for blurred vision according to acute versus chronic presentation and unilateral versus bilateral symptoms.

Box 2: Potential causes of blurred vision⁴⁻⁷**Unilateral, painful, sudden onset**

- Acute angle closure glaucoma
- Giant cell arteritis
- Other optic neuritis (multiple sclerosis)
- Corneal ulceration or trauma
- Uveitis
- Endophthalmitis (inflammation of the internal eye tissues, usually due to infection)
- Orbital cellulitis (inflammation of the eye tissue behind the orbital septum)

Unilateral, painless, sudden onset

- Mostly retinal, think detachments or vein/artery occlusions
- Wet age-related macular degeneration
- (If transient) amaurosis fugax

Bilateral, painless, quick onset

- Cerebral vascular disease
- Raised intracranial pressure leading to papilloedema

Unilateral or bilateral, painless, gradual onset

- Refractive
- Diabetic or hypertensive retinopathy
- Cataracts
- Open angle glaucoma
- Dry age-related macular degeneration
- Other systemic disease (often inflammatory in nature)
- Iatrogenic (drugs such as hydroxychloroquine or amiodarone)

Note that age is also an important diagnostic consideration. For example, sudden unilateral painful loss of vision in an 80 year old patient requires exclusion of giant cell arteritis, whereas a similar presentation in a 30 year old may point towards ophthalmic presentation of multiple sclerosis.

Targeted examination

Information gathered from a focused history will ideally point towards a likely diagnosis (see [box 2](#)). A focused physical examination is the next, essential investigation in order to further identify red flags and determine which patients need to be referred for ophthalmology evaluation and how urgently. Where possible, the examination should include external appearance, visual acuity, visual fields, eye movements, pupillary reactions, fluorescein staining, and direct ophthalmoscopy.

External appearance

External eyelid appearance may suggest a periorbital cellulitis. Features of orbital involvement include proptosis, restriction in eye movement, and features of optic nerve dysfunction such as a relative afferent pupillary defect (RAPD) or reduced colour vision, any of which warrants urgent hospital referral or admission.

Circumferential conjunctival injection or ciliary flush ([fig 1](#)) may suggest uveitis, whereas generalised diffuse redness is more likely to suggest conjunctivitis. Sectorial injection may point towards episcleritis, but if the globe is tender, then the more sight-threatening scleritis needs to be considered.²

Visual acuity

Visual acuity should be assessed by means of a Snellen chart with the patient wearing their spectacles if these are for long distance. This is easy to do by simply printing off a 3 m Snellen chart or even using certain mobile apps. Having 6/6 vision or

better does not exclude all serious pathology, and patients with peripheral retinal pathology may well have preserved visual acuity, but good visual acuity on exam tells you that the direct pathway of light through the eye is relatively unobstructed (it requires a clear central cornea, lens, vitreous, and a functioning macula and optic nerve).

An often underused tool in primary care is the use of pinhole occluders with Snellen charts. The pinhole occluder is an opaque shield with one or more small openings through which the patient attempts to read the Snellen chart. These can be bought or can be hand made by creating a hole in a piece of paper using a pin or pen-tip.³ A pinhole occluder removes scattered light, so that light entering the eye is focused through the centre of the lens onto the retina. If patients achieve significant visual acuity improvements with a pinhole occluder, this points towards a refractive component to their visual impairment.

Visual fields

Visual field testing outside of an ophthalmic or optometry unit is usually done via the confrontation method.³ With the patient keeping one eye closed and their gaze kept steady on your nose, you can assess their peripheral vision by asking them to count fingers in each quadrant of their field of view. Repeat the test with the other eye. This can identify gross neurological defects such as homonymous hemianopia that would require prompt referral. More subtle peripheral vision losses, such as in early glaucoma, are not usually picked up with this testing.

Diplopia, ocular motility, and eye movements

Monocular diplopia (double vision that persists with one eye closed) often suggests a problem within the eye itself (from cataract to refractive error). Binocular diplopia (double vision that disappears with one eye closed), on the other hand, suggests an ocular alignment problem which, if acute, could be due to a cranial nerve palsy or intracranial lesion, especially if accompanied by the typical eye movement limitations. Pain with extra-ocular muscle use and evidence of optic nerve dysfunction may indicate optic neuritis.

Pupils (including testing for RAPD)

Testing for a relative afferent pupillary defect requires swinging a bright light from eye to eye. If the pupil of the stimulated eye dilates rather than constricts, then a relative afferent pupillary defect (RAPD) is present, which indicates a serious underlying pathology of the optic nerve or retina.⁴

Irregular pupil sizes can also be a cause for concern if the discordance is new: causes range from third nerve palsy to inflammatory conditions such as uveitis causing synechia (iris being stuck to the lens), although the latter usually presents with a red painful eye.

Direct ophthalmoscopy

An ophthalmoscope can be used to check for a red reflex. If there is no red reflex in one eye, then this may indicate gross pathology in that eye. Examining an eye with a direct ophthalmoscope provides a magnified view of the central retina and optic disc, but limited view of the periphery. For clinicians who are able to visualise the fundus, it would be helpful to comment on the appearance of the optic nerve and determine whether it is swollen (see [fig 2](#)).

Fluorescein staining

When available, fluorescein staining allows you to assess the integrity of the cornea, and will highlight areas of damage to the corneal epithelium.⁴ Fluorescein is widely available in the form of drops or strips. There are minimal contraindications for this test (such as fluorescein allergy), but it will require removal of contact lenses. Under fluorescein staining, any area of corneal epithelial damage will appear bright green under cobalt blue light ([fig 3](#)). Prominent staining with white corneal opacification (infiltrates) could be suggestive of a corneal ulcer, which will require an urgent referral.^{3,4}

Further investigations within primary care

After the directed history and physical exam, further evaluation will usually be undertaken by an ophthalmologist or optician (see [box 3](#)). A few tests may be indicated at the primary care level if history and physical exam findings are consistent with a new onset systemic disease or worsening of an existing one.

Box 3: Referral criteria^{4,5,7,8}

Same day urgent referral to hospital or urgent discussion with ophthalmology

- All patients with eye-related trauma
- Contact lens-related corneal ulcers
- Red flag headaches (for example, precipitated by Valsalva manoeuvre, older age at onset, thunderclap headache, associated neurological deficits, associated weight loss) with signs of optic disc swelling (see [fig 1](#))
- Sudden onset, painful loss of vision, especially if symptoms of giant cell arteritis are present
- Sudden onset, painless loss of vision suspicious for retinal arterial occlusion
- Sudden onset loss of vision suggestive of retinal detachment (for example, the sensation of a black curtain coming down across the field of vision in one eye)
- Red eye with recent ocular surgery, headache, nausea and vomiting, non-reactive pupils, or loss of vision
- Suspected giant cell arthritis with ophthalmic involvement
- Peri-orbital cellulitis with suspicion of orbital involvement
- Suspected optic neuritis—Pain with eye movements and evidence of optic nerve dysfunction such as reduced visual acuity, loss of colour vision, or relative afferent pupillary defect (RAPD)

Prompt referral to ophthalmology (patient should be seen within a few days) or discussion with ophthalmology if any uncertainty

- New floaters with persistent flashes
- New or worsening central visual distortion
- Isolated visual field defect
- Shingles with eye involvement
- Pre-septal cellulitis without suspicion of orbital involvement

Routine referral to ophthalmology or opticians (patient to be seen according to local referral pathway guidelines)

- Gradual onset blurred vision that is fully corrected with pinhole occluder without any associated visual symptoms
- Dry eyes
- Lid malposition (ectropion or entropion)
- Sticky eyes of prolonged duration with normal vision

Systemic investigations

The following blood tests may be considered⁹⁻¹¹:

- HbA_{1c} in patients with suspected diabetic retinopathy (typically patients with known diabetes)
- Inflammatory markers such as erythrocyte sedimentation rate, plasma viscosity, or C-reactive protein may be helpful in patients with suspected giant cell arteritis with ocular

involvement or other inflammatory aetiologies in addition to urgent ophthalmology referral

- Blood pressure should be measured in all new cases of blurred vision.

What next?

In most areas of the UK, local eye services have a triage hotline with specialists who can assist in assessing the urgency of a referral. There may also be optometrists who can see urgent referrals.^{8,12} Box 3 provides a summary and guide to the urgency with which referrals should be made depending on the patient history and physical examination findings. Please note this is not an exhaustive list of ophthalmic complaints, so do not hesitate to liaise with your local eye unit if there is any clinical concern. Local referral protocols may differ, and it is important to be aware of regional guidelines and service availability.

Patients with significant visual loss are likely to be unsafe to drive, and patients with blurry vision can be advised in accordance with local legal requirements.¹³

A typical case of blurred vision

A 25 year old office worker presented with blurred vision and tension headaches when staring at his computer for a prolonged period. His headaches grew worse towards the end of the working day, and he felt the need to squint in order to see his screen clearly. He was concerned that his vision and headaches were getting worse and were now affecting his day-to-day life. His headache was not worse when lying down nor on coughing. He described no recent weight loss, weakness, or change in sensation. He had no medical history of diabetes, malignancy, or recent head trauma.

Examination showed a visual acuity in the left eye of 6/24, and in the right eye of 6/18. With use of a pinhole occluder, the left eye achieved 6/9, while the right achieved 6/6. The rest of the examination was unremarkable.

This presentation may be familiar to many, and common in people who do not regularly visit an optician. The almost full resolution of blurriness and excellent vision with a pinhole occluder suggests a degree of refractive error, and, absent any other associated symptoms or medical history, we are less concerned about a serious underlying pathology. The headaches are likely to be due to excessive accommodation of the eyes during the day.

This patient was advised to visit his local opticians to get an up to date refraction, with a warning that if his vision changes acutely to seek medical advice. His GP advised him not drive until he obtained corrective lenses.

Education into practice

- Do you ask about risk factors for diabetes or hypertension when a patient presents with blurred vision of gradual onset?
- In patients whose primary complaint was bilateral blurred vision, how many had documented discussions about DVLA guidance on driving?
- Think about the last time you examined a patient's visual fields. Were you clear with your instructions, or was there a learning curve for the patient? How might you alter your language to ensure a more accurate and efficient test?

How patients were involved in the creation of this article

Patient experiences were collated through clinical experience of the authors, with feedback taken generally from Hull University Teaching Hospitals NHS Trust. Their experiences fed into the article, especially the focus on a direct and straightforward patient journey.

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Images were sources from "free for educational use" databanks or created by the authors themselves.

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Figures

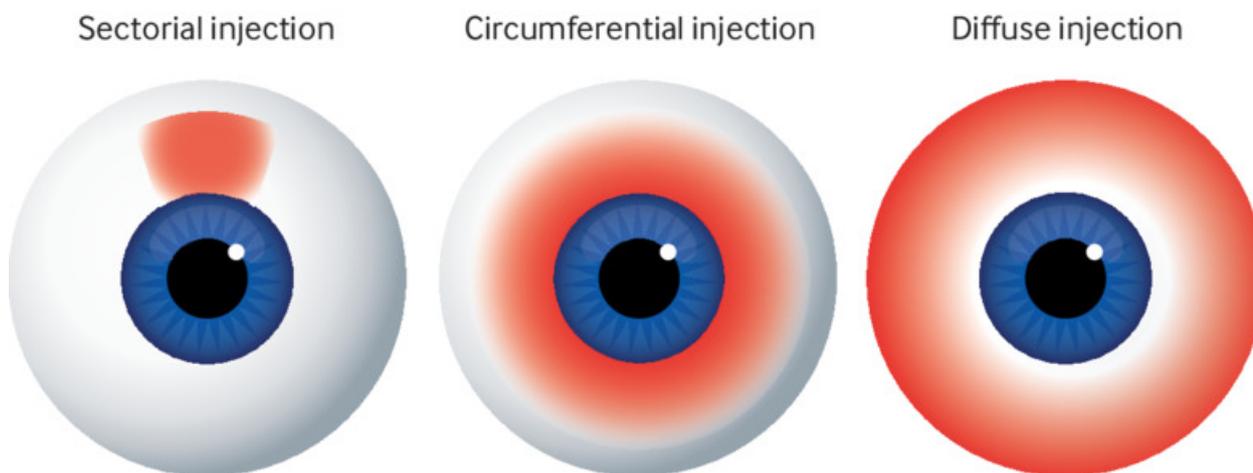


Fig 1 Digital image highlighting circumferential injection versus sectorial injection



Fig 2 Example of a swollen optic disc on fundus examination. Note the blurred disc margins and raised optic disc causing distortion of blood vessels at the disc margin

[Image: Retinal Gallery: <http://retinagallery.com/index.php>]

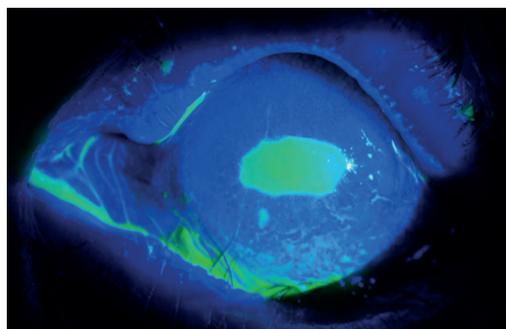


Fig 3 An area of dense fluorescein pooling, highlighting an area of corneal epithelial defect

[Image: Retinal Gallery: <http://retinagallery.com/index.php>]