SELECTING LOW VISION AIDS

PART 1: ACCORDING TO THE PATHOLOGY

When assessing the low vision patient, understanding the pathology involved is important, advises Jennifer Brower

One of the prime considerations in assessing the low vision patient is the pathology which has caused the reduced vision. Understanding the pathology involved, and the type and severity of its effects, will help you give your patient the best possible advice. Without this knowledge you will be playing a guessing game, relying on the patient to explain their symptoms and offering low vision aids on an unscientific 'try it and see' basis. An awareness of the complications of systemic diseases such as diabetes or AIDS will enable you to anticipate the type of vision loss, ask the right questions, and be confident in the choice of aids you suggest. The effects of ocular pathologies on the vision may be divided into three main categories: those causing central defects, peripheral defects or a general reduction over the whole field, although it should be remembered that some conditions may affect one or more of these areas, and there will be patients with two or more diseases affecting the vision.

Central defects

Age related macular degeneration (age related maculopathy) is the commonest eye condition presented and in many ways the easiest to deal with. There are two main types; dry or atrophic, which is slowly progressive and leads to mild or moderately severe vision loss, and the less common wet or atrophic ARMD, associated with detachment of the retinal pigment epithelium, choroidal neovascularisation and a resultant disc shaped scar, which accounts for around 90 per cent of blindness from ARMD. Most cases begin with the involvement of one eye only, but it usually becomes bilateral. Damage to the macula causes a central distortion or scotoma, and some loss of colour vision, depending upon the severity of the condition. However, the area of macular damage has less effect on the vision when the image of the object is magnified, and the type and power of magnifier offered can be tailored to the extent of the problem. Other pathologies typically causing central defects include macular hole, which produces a central scotoma, juvenile macular dystrophies such as Stargardt's disease, characterized by a developing mottled fovea and oval lesions of the macula, and Best's disease, where the macula develops a yellow lesion which leaves a pigmented scar. Cone dystrophy is associated with a bull's eye macular lesion, progressive vision loss and impaired colour vision. Patients will suffer day blindness but near normal vision in dim conditions. Where the macula is damaged, patients will retain normal or near normal peripheral vision, so mobility will not be affected, and the practitioner can concentrate on enlarging the image for reading and distance visual tasks. The macula may also be significantly affected in other diseases, for example hemianopia, optic atrophy and the later stages of glaucoma, but in these cases the effects on vision will include peripheral defects with a resultant effect on mobility.

Elderly patients with maculopathy will often tell you they cannot read at all, and this may sound alarming to the inexperienced practitioner. What they usually mean is they cannot read fluently the same newspaper, magazine or other item which they were previously able to read quickly and easily. Where the problem is of recent and sudden onset, the perceived impossibility of the situation can generally be rectified by careful assessment of the near visual acuities and magnification required, together with demonstration of a suitably powered magnifier of the appropriate type. It is worth noting that patients whose reading acuity appears to be N5 in your brightly-lit consulting room, may be genuinely struggling to read N8 at home in dim conditions, so advice on appropriate illumination is essential.

The principle of magnification to overcome macular problems is simple. When the patient looks at a line of print, a central distortion or scotoma covers

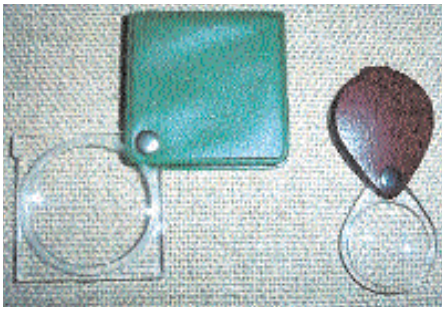
some of the letters and the word cannot be read. When the image is magnified, the letters appear larger but the scotoma remains the same size and so has less of an impact on the words. The exact position of a scotoma will affect the amount of magnification required. If it is to the right of centre, higher magnification may be needed where the patient is reading left to right and directly into the scotoma. If the scotoma is to the left of centre, less magnification may be required. There is a wide range of magnifying aids available to help patients with central defects. These include illuminated and non-illuminated hand and stand magnifiers, spectacle magnifiers, telescopes for distance and near vision, flat field magnifiers, pocket magnifiers, bar magnifiers and clip-on loupes. CCTV systems are becoming more widely available, and there are less expensive portable systems, where the camera is linked to the patient's own TV. Computers can be programmed with large font sizes and the print size of e-mails can be increased. Children with macular problems but normal accommodation may be able to achieve enough magnification by bringing the page closer and/or photocopying pages of print two or three times the size. Very young children will be unable to cope with sophisticated magnifying aids, and do not usually have to read very small print. Older children will generally use a variety of aids: a distance telescope for travelling to school by bus or train, a computer or CCTV at school, a stand magnifier for reading and writing homework and a small hand or pocket magnifier for the shops.

Children generally have a positive attitude to their visual problems, and accept low vision aids with enthusiasm, although occasionally children will resist using aids because they do not want to seem 'different' from their normally sighted friends. A fourteen-year-old schoolgirl who needs a telescope to read bus numbers may be persuaded with a small monocular fitted with a finger ring. This can be hidden in the palm of the hand and brought up to the eye when needed. A small domed flat field magnifier can also be palmed effectively, and produced when necessary to read the price on a magazine or CD.

The amount of magnification selected will vary in relation to the acuity levels and visual task, for example a patient with a reading acuity of N48 may use a 6x spectacle magnifier to read a newspaper but only need 3x to read a large print book. An insulin dependent diabetic with N36 may use a 7x clip on loupe to read syringe markings but a 3x stand magnifier to fill in a crossword.

Non-optical aids are also useful for patients with central defects. One widely used is a typoscope. This is a matt black card, approximately the size of a credit card, with a central horizontal slit, which can be used as a signature guide or line guide for reading. Contrast is improved by the black border surrounding the print on the white page. Larger typoscopes are available for use with pension books and writing cheques. Other non-optical aids include illumination, filters, large print books, big number telephones and large print playing cards, and writing aids such as broad lined paper and thick felt pens. Where high levels of magnification are required, it is impractical to expect patients to sustain lengthy periods of reading, and aids which make use of senses other than sight can be very helpful. Some examples are 'talking' books, newspapers and watches, 'voices' on electronic diaries and computers, and

Effective use of illumination ▶



▲ Pocket magnifiers

▼ A selection of filters

▲ Poppy - a guide dog in training *(Photograph by kind permission of Guide Dogs for the Blind Association)*

tactile aids as diverse as needle threaders, pavement bumps by zebra crossings, using different shaped containers for tea, coffee and sugar and rubber bands around tins of pet food. High powered magnifiers may still be given for 'survival' reading, such as utility bills, bank statements and letters, and cooking times on food packs, and these will help the patient maintain some independence and privacy.

Peripheral defects

Glaucoma is the most common pathology causing loss of field and occurs from damage to the optic nerve. It is often associated with increased ocular pressure, although around 50 per cent of glaucomas are now seen in patients with normal or low ocular tensions. Acute attacks must be treated immediately. In chronic simple glaucoma, the visual field constricts, at first without the patient noticing, and if untreated, may reduce until only tiny central and temporal areas of vision remain. In some cases glaucoma may cause complete loss of vision. Other pathologies causing varying degrees of field loss are retinitis pigmentosa and other retinal dystrophies, hemianopias and optic atrophy. Magnification is not appropriate for these conditions, unless the central vision becomes involved, but the patient's mobility may be seriously affected, so a guide cane may be provided. Where the central acuity is unaffected, a reverse telescope may be useful. By reversing a distance telescope, the image is minified but the field of view increased, so a patient looking at a notice board will be able to see more information at once. Used in this way a telescope is known as a field expander. Other types of field expander are mirror or prism systems, used in cases of hemianopia to reflect or refract more information into the patient's field of view.

Reduced vision over the whole field

Cataract, corneal dystrophy and some retinal dystrophies cause a general reduction in vision. Diabetic retinopathy is associated with neovascularisation and haemorrhage – which causes patchy field loss and black spots in the visual field – traction of the vitreous – which induces apparent flashes of light – and retinal detachment. The symptoms tend to fluctuate. Diabetic retinopathy may affect the macula, although laser photocoagulation is often given as a preventative measure. New, fragile blood vessels around the macula are destroyed in an attempt to prevent invasion. High myopia has a high incidence of retinal detachment, other effects are macular change and retinal haemorrhage leading to reduced acuity and constricted visual fields. Around 75% of patients with AIDS develop ocular problems and about 40% develop cytomegalovirus retinitis (CMV). Signs include retinal haemorrhage and opacification and sometimes total retinal atrophy or detachment.

Albinism is often associated with nystagmus, reduced acuity and photophobia. For severe photophobia filters are available as dark as 1% LTF, but where the acuity is seriously reduced, this should be taken into account to prevent mobility problems. An alternative solution is an opaque lens with a stenopaic slit to admit minimal light. Where there are lens and/or other media opacities, the patient may suffer a disability glare, particularly in bright sunlight, where light entering the eye is scattered by these opacities, reducing contrast, and causing a white glare effect. Amber filters which absorb blue light can improve contrast significantly. Preventing light entering the eye is also recommended by wearing a sun visor or large brimmed hat, or tinted spectacles with sideshields. A guide cane may be given in cases of very low acuity. Some patients will also have a guide dog.

Magnification can also be useful where the whole field is affected – the larger and bolder the image, the easier it is to see – but where contrast sensitivity is low, and in cases of photophobia, care must be taken to avoid flooding the eye with light, so non-illuminated magnifiers, often in conjunction with a typoscope, may prove more successful than illuminated units.

The older the patient, the more likely that the ocular pathology will not be the only disease present. Some patients will be arthritic and unable to grasp a magnifier handle or focus a monocular, or have a head or hand tremor. Other patients may have hearing difficulties, general mobility problems or communication difficulties caused by a stroke. It is not unusual to see a combination of ocular pathologies – glaucoma and macular degeneration, high myopia and cataract, macular degeneration and cataract – so the type of aids offered must be carefully selected for the patient's maximum benefit and minimum inconvenience. Regular review is important to check if the pathology has progressed and acuity levels changed, requiring different or additional aids, and children should be monitored frequently. Patients with age-related cataract, glaucoma and diabetic retinopathy are likely to have greater visual changes than a patient with dry macular degeneration but the priority in the selection of aids must be to understand the pathology involved, its effects on vision and the types of aids which will best meet the needs of the individual patient.

Reference

J J Kanski, 'Clinical Ophthalmology' 4th edition, 1999, Butterworth-Heinemann.

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