OCULAR PATHOLOGY AND LOW VISION

PART 3: ASSESSING THE PATIENT WITH AGE RELATED MACULAR DEGENERATION

Anne Eyre discusses how low vision is either inherited or acquired.

In general terms, low vision can be either inherited or acquired. Defective vision, which is not genetically transmitted, may occur as a result of ocular or neurological trauma, through disease, through toxicity or through the ageing process.

It is possible to identify a number of factors that contribute towards the likelihood of a successful low vision assessment. Consider tables 1 and 2.

Those in **Table 1** can be quantified and measured against recognised standards. Of those in **Table 2** some, like patient handling and the establishment of trust with a patient are likely to be influenced by the personality and experience of the practitioner. The remainder, however, are beyond the influence of the assessor, yet these are the most important in determining the successful outcome of an assessment.

Acceptance and adaptation

It is clear in low vision work that there are two very important correlations. The duration of the visual problem, which is related to the likelihood of the patient accepting that their condition is permanent, and the age of onset, which may have a direct bearing on the ability of a patient to adapt to their new situation.

In general terms, adaptation is directly correlated to age. The younger the person, the greater the degree of adaptation. Acceptance is more likely when the visual problem has existed for some time. As the correlation between low vision and age is high and the correlation between adaptability and age is low, this is obviously an area of difficulty when assessing the elderly patient.

Visual ability

Visual ability can be considered as the ability of the individual to utilise their residual vision. It is the way in which a person learns to cope with their problems. It is highly individual and has no direct link with the severity of visual loss. Instead, it is closely linked to the individual's hopes, fears, aspirations and personality. It explains why there is such a wide differential between people's ability to cope with visual loss. What one individual will accept as a minor impairment, will render another totally incapable of functional movement.

It is impossible to measure this in any objective way, however, it is singularly important in determining whether there will be an improvement in visual performance.

Assessing the elderly patient

The structure of a low vision assessment follows a similar pattern irrespective of the ocular pathology. However, when dealing with the elderly the pace of the assessment needs to be adjusted to suit the mental and physical limitations, which old age brings. Poor vision may be only one of a number of age related problems that the elderly patient has to cope with. It is often necessary to arrange several visits, to avoid overtiring these patients.

In many ways it can be helpful to the practitioner to allow relatives or carers to sit in on the consultation. However, this should only be allowed with the consent of the patient, to avoid compromising confidentiality.

Patient expectation

One of the major problems when dealing with the elderly patient is establishing realistic expectations. What does the patient expect from a low vision assessment? Unfortunately, they often expect to be able to see as clearly and as easily as they did before the onset of their problem. Or, they will exhibit totally negative attitudes, denying the possibility of any likelihood of improvement. Either situation is difficult and needs to be handled carefully.

Any low vision aid is a compromise. Unfortunately, it is often difficult to persuade elderly people to adopt a new way of reading. We all have the patient who could be helped providing they accept a shorter working distance, but who resolutely refuse to budge from a favoured position.

In addition to the specific problems induced by the pathology of Age Related Macular Degeneration, (ARMD) there are a number of physiological changes that occur in every ageing eye. These changes primarily affect the pupil and the lens. In the ageing eye the pupil becomes more constricted than that of a younger person, thus reducing the amount of light

The practitioner's competence
Careful control of the assessment procedure
The type and extent of the underlying pathology
The residual visual acuity

Above: Table 1.

Skillful handling of patients and their relatives
The establishment of trust between patient and practitioner
The willingness of the patient to accept compromise
The patient's acceptance of their visual problem
The patient's ability to adapt to their impairment
The patient's visual ability

Right: Table 2.

entering the eye. The lens becomes more yellow and there is an increasing likelihood of opacification, this not only reduces the perception of colour, but also increases the scattering of incident light.

The decrease in retinal illumination was researched by RA Weale *'The ageing eye'*. In 1963, he found that the average 60 year old only received one third of the light reaching the retina of a 20 year old. This, along with the increased pupil miosis normally associated with near vision tasks presents a need for greater illumination. Add to this the presenting pathology of ARMD, and we can see that there are potential problems with near vision.

Visual acuity in ARMD

In most cases the patient with ARMD will present with a disproportionately low near vision acuity, compared with their distance. This is due to the central scotoma that results from the breakdown of the retinal pigment epithelium. In the first article in this series we identified that the best visual acuity in the eye is at the macula, and that this decreases as we move towards the periphery of the retina.

To appreciate the difficulty which these patients experience, consider the two lines of text in **Table 3**.

As the patient scans the text, the central scotoma obliterates so much of the normal size of print, that it becomes illegible. The effect of increasing the size of print allows more of the letters to be seen, thus improving word recognition. The scotoma remains, but its effect is lessened.

The use of magnification

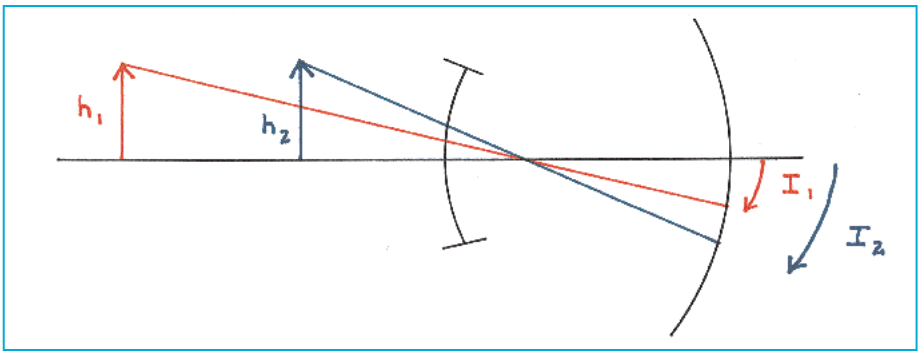
The key to success in low vision assessment is the ability to increase the retinal image size. With ARMD, the aim is to enlarge the image, such that it is received in an area of the retina that lies outside the scotoma.

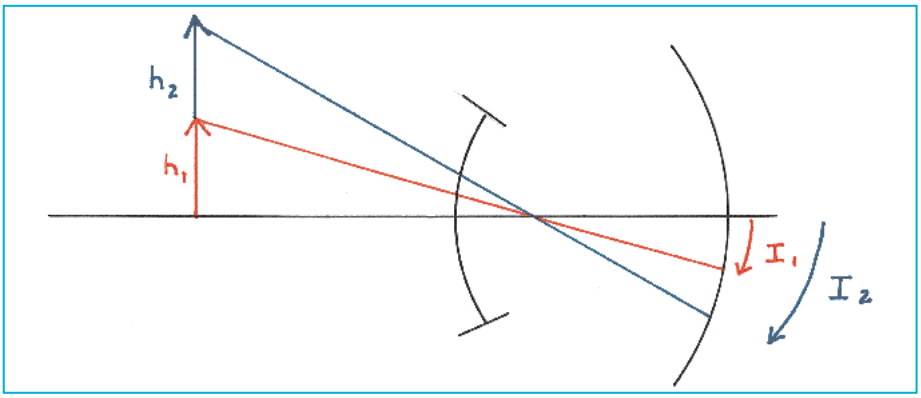
Retinal image size can be increased in a variety of ways. It can be increased by moving an object closer **[Figure 1]** this is known as Relative Distance Magnification. It can be increased by enlarging the object **[Figure 2]** this is Relative size magnification. Using some kind of magnifying device can also increase the size of the retinal image. This is termed Angular Magnification **[Figure 3]**. It is possible to combine all three types to produce higher degrees of magnification.

This text represents the normal print found in magazines and books
[12 point]
This is the size of print found in large print books.
[16 point]

Above: Table 3.

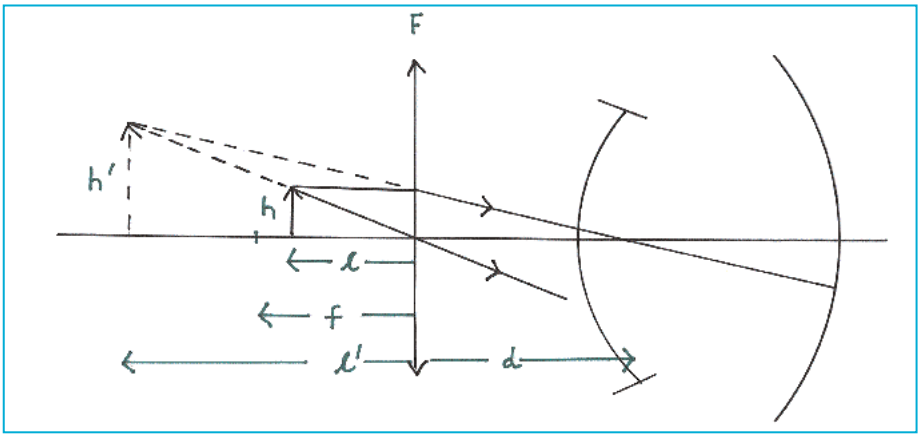
Below: Figure 1 - Relative distance magnification.





Above: Figure 2 - Relative size magnification.

Below: Figure 3 - Angular magnification.



Establishing the degree of magnification necessary

When assessing a patient with ARMD, how can the degree of magnification needed to improve their acuity be determined? To achieve this it is necessary to know both the present acuity of the patient and to know the degree of acuity needed for the patient to carry out their desired tasks. It is very important that each patient has been refracted recently. There is little to be

gained by enlarging a blurred retinal image.

Consideration needs to be given both to distance vision and to near.

Distance vision

Although ARMD may affect both eyes, it is likely that the onset will occur at different times; therefore it is unlikely that the acuities in each eye will be the same. If there is a disparity, then consideration needs to be given to the suitability of supplying a binocular or monocular aid.

The acuity of each eye needs to be checked and recorded, and then an approximation of the size of the desired task needs to be made. It is not possible to accurately measure this in the consulting room, so some form of estimate needs to be made. To calculate the likely degree of magnification needed involves comparing the achieved acuity with the acuity necessary for the task in hand.

$$\text{Magnification required} = \frac{\text{Actual visual acuity}}{\text{Desired visual acuity}}$$

For example, a patient may wish to read the departure board at a station

Actual acuity = 6/36
Acuity necessary for the task = 6/6

$$\text{Magnification needed} = \frac{6/36}{6/6} = 6x$$

It is obvious that the smaller the task and the lower the acuity, the greater the degree of magnification.

Near vision assessment

The assessment of near vision acuity follows much the same pattern, in that both eyes are assessed separately, the acuity recorded, and the size of task required ascertained. It is easier to simulate real tasks for near vision, as most will involve reading tasks, which can then be verified. With near vision, it is important to determine the duration of the task to be undertaken. When long periods of sustained reading are necessary, it is important to increase the degree of magnification used, to reduce the strain.

Again, the degree of likely magnification is made using a comparison between the achieved acuity of the patient and the acuity necessary to perform their chosen task. It is pointless improving near vision acuity to N4 if the patient only wants to read N12.

Selection of aids

The selection of suitable aids for the elderly may well be influenced by factors additional to the degree of magnification required. Where there is a significant hand tremor, a stand magnifier may be a better option than a hand held unit.

Binocular distance units may well be easier to handle than a monocular telescope.

The disparity of acuity often present in ARMD, may well preclude the choice of a binocular near vision unit. If a monocular unit is to be used, then thought must be given to the use of an occluder or a frosted lens for the other eye.

In general terms, it is often best to use the simplest unit that gives the desired degree of magnification. This means that the unit is more likely to be used and reduces the effect of frustration for the patient.

Magnifiers

It is important to remember when selecting a magnifier that manufacturers do not all label their products using the same method. Some calculate the power of the unit using M=F/4 (Nominal Magnification or Magnifying Power)) whilst others prefer M=F/4+1 (Maximum Magnification or Iso-accommodative Magnification). Although BS 7522 in Britain requires the dioptric power of the lens to be calculated using equivalent power (M=Fe/4) this does not apply to magnifiers manufactured abroad.

Similarly the effective power of the lens will be determined by the position of the magnifier relative to the eye or the print as well as the accommodative power of the patient.

Telescopic lenses

In low vision work there are two main types of telescopic lenses, Galilean and Astronomic systems. Each has different properties. The Galilean system comprises a high-powered negative eyepiece and high-powered positive objective lens. This has the advantage of producing an upright image and a compact tube length. Its power range for low vision use is limited to a maximum of 3x because of the lens powers used.

The Astronomic telescope has positive powered eyepiece and objective lenses and can produce greater powers of magnification. It results in a more bulky unit because it needs to incorporate prisms to re-invert the image before it can be used for low vision work.

Some patients prefer to compromise the level of acuity in favour of a unit that gives a wider field of view and depth of focus. In this instance full aperture lenses may need to be considered. The important factor is that whatever type of unit is supplied it should provide some degree of visual stimulus and enable the patient to maintain a degree of independence. Adequate training should always be given so that the patient is able to use their aid effectively.

Non optical aids

All low vision assessments should include the provision of non-optical aids. If these fall outside the remit of the practitioner, then information should be given about where these can be obtained. It is important to develop a multi-disciplinary approach to patient care, and to liaise with social services, benefits agencies and the rehabilitation officers, to ensure that patients receive the best help available.

The most effective non-optical aid is often a directional lamp. Increasing light intensity can significantly improve reading ability. It is important that the lamp be positioned to reduce the possibility of glare. This is often best achieved by positioning the lamp to the side of the patient and lowering the bulb so that it is close to the text, this gives the maximum illumination possible.

With ARMD normal scanning of text can be difficult because words or letters disappear into the area of scotoma. The use of a simple typoscope (a piece of black card with a vertical or horizontal slit), or training in the use of eccentric fixation or steady eye technique can be helpful.

The provision of large print books or talking books and newspapers may well provide an additional source of motivation for these patients. Enlarged bank statements and utility bills are readily available on request.

Those of us who work as low vision practitioners know how frustrating ARMD can be for the patient and their relatives. Despite the research, a cure, especially for the non-exudative type seems a long way off. When you encounter these patients, be sympathetic to their problems. Where appropriate refer them on to a low vision practitioner so that their needs can be ascertained and, hopefully, help can be given to enable them to retain their independence and privacy.

References:

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