

THE ROYAL COLLEGE OF
OPHTHALMOLOGISTS

AGE RELATED MACULAR DEGENERATION

GUIDELINES

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Contents

Introduction	3
Definition	4
Epidemiology:	4
Demography	4
Risk factors	4
Prognosis and Natural History	4
Drusen	5
Unilateral AMD	5
Pigment epithelial detachment	5
Subretinal neovascularisation	5
Polypoidal choroidopathy	5
Management pathway	5
i) Diagnosis and assessment	6
History	6
Examination	7
Angiography and colour photography	7
ii) Treatment	8
Laser photocoagulation	8
Newer treatments as yet of unconfirmed value	9
Management of other co-existent disease	10
iii) Rehabilitation	10
Provision of Low Vision Aids.	10
Visual handicap registration.	11
Training and coping strategies.	11
Statutory and voluntary support services in the community.	11
Appendix 1	13
Goals and objectives for the management of macular degeneration	
Appendix 2	15
Criteria for visual handicap registration	
Appendix 3	16
Example of fluorescein information sheet and consent	
Appendix 4	17
Useful addresses	
Appendix 5	18
Glossary of terms.	
References	20
Members of Guidelines Group	24

Introduction

Age related macular degeneration (AMD) accounts for almost 50% of those registered as blind or partially sighted.¹⁻⁴ The development of management strategies is limited by the diverse nature of the age related changes and a lack of a clear understanding of the process of visual loss in the elderly. Effective treatment is limited to the management of sub-retinal neovascularisation (SRNV) in selected cases. Despite early expectations that laser treatment might provide significant benefit in preventing blindness⁵⁻⁷ recurrent disease and progressive visual failure limit the final outcome.⁸⁻⁹ Early recognition and prevention of potential disease is not as yet applicable to disease other than that related to SRNV

The aim of management is to minimise visual loss and disability in order to maintain independence. The provision of visual aids, advice about lighting and support in the home and community, with registration as necessary, remain the mainstay of management.

The purpose of these guidelines is, therefore, to define our current understanding of the condition and to outline a management strategy (Appendix 1) that may be adopted or modified, depending on local needs and facilities, by ophthalmic services in the UK

Definition

Despite attempts to derive a classification and grading system for the disease there is no fully accepted definition of age related macular degeneration. The International Epidemiological Study Group¹⁰ defines Age Related Maculopathy (ARM) as a disorder of the macular area, most often clinically apparent after 50 years of age, characterised by:

- discrete whitish-yellow spots identified as drusen.
- increased pigment or hyperpigmentation associated with drusen.
- sharply demarcated areas of depigmentation or hypopigmentation of the retinal pigment epithelium and associated drusen.

These age related changes with progressive accumulation of debris under the retina predispose to late stage ARM identified as Age Related Macular Degeneration (AMD)^{11,12} which may be 'wet or dry' and feature:

- geographic atrophy of the retinal pigment epithelium with visible underlying choroidal vessels.
- retinal pigment epithelial detachment with or without neurosensory detachment.
- sub-retinal or sub-pigment epithelial neovascularisation.
- fibroglial scar tissue, haemorrhages and exudates.

These changes lead to progressive visual loss and worsening function in the elderly.

Epidemiology

Demography

Between 13,000 and 14,000 people are registered each year as blind or partially sighted in England and Wales⁴ but it is difficult to determine the total number of visually disabled people in the United Kingdom. There are approximately 150,000 people aged 16 years and over living in private households who are registered as visually disabled. This probably significantly underestimates the true number that may be up to 1,000,000¹³ and closer to the 2.2% of the population over 65 years identified in the Framingham Study³ as blind in one or both eyes from AMD.

The incidence and prevalence of severe visual loss increases with age.^{1,14} In 1997-8 3.7 million ophthalmic consultations were undertaken in England¹⁵ 60% of which will have involved people aged 60 or over.¹⁶ In one study 14.1% of all visits to ophthalmologists by those over 65 were for retinal problems.¹⁷ Macular degeneration accounted for the biggest single group. With the population over the age of 60 set to increase by 45% in the next 20-25 years the increased load on both the Health and Social Services and personal costs to the quality of life of individuals affected by macular degeneration is daunting.

Risk factors.

It is usually held that AMD is most prevalent in Indo-European societies,¹⁸ but it may be increasing in other communities.¹⁹⁻²² Genetic and environmental factors appear to modify the risk of visual loss although the relative importance of these remains unclear.²³⁻³⁰ Cigarette smoking has recently emerged as a reasonably consistent risk factor.^{31,32} Vascular disease and hypertension are sometimes associated with macular degeneration but other associations such as light exposure³³ are not established risk factors. Dietary carotinoids, vitamin levels and antioxidant use has not to date been shown to modify risk.^{34,37}

Prognosis and Natural History

Conclusions relating to the natural history of any condition will be dependent on the population studied. Hospital-based studies include a substantial proportion of patients for whom symptoms have

prompted presentation, and who consequently may be at greater risk of visual loss. Community derived studies should provide a better reflection of the true risk and prevalence involved.

Drusen.

For those with bilateral soft drusen (ARM) seen in hospital the risk of progressing to AMD with loss of vision in one eye appears to be in the order of 8% per year over a three year period.^{38,39} This risk is highest in those with confluent drusen, focal hyperpigmentation or slow choroidal perfusion on angiography.⁴⁰

Unilateral AMD.

With AMD-related visual loss affecting one eye the risk of losing vision in the fellow eye increases to between 7 and 10% annually.⁴¹⁻⁴³ The five year risk is lowest in the absence of large drusen or pigment hyperplasia but increases with one of these risk factors to 30% or with both to over 50%.⁴⁴ The highest risk is for those with a pigment epithelial tear in one eye for whom the annual risk of second eye involvement is closer to 40%.⁴⁵

Pigment epithelial detachment.

Pigment epithelial detachment in patients under the age of 55 years is not usually associated with significant visual loss^{46,47} but occurring in those over 55 is likely to result in visual loss within 4 years in the majority of patients.⁴⁸ Such loss may reflect the presence of neovascularisation under the detachment.

Sub-retinal neovascularisation.

Sub-retinal neovascularisation can occur throughout the fundus but rarely gives rise to complications save in the macular area where it is associated with visual loss. Angiographically well defined neovascular systems lying away from fixation may on occasions be modified by treatment. If untreated, visual loss may be rapid with neovascular extension under fixation in 75% of cases within a year^{6,7} such that 60% develop severe visual loss within 3 years.⁹ Less well defined neovascularisation is considered untreatable and grows more slowly, but still 40% develop severe visual loss within 2 years.^{49,50} Juxta papillary lesions tend to extend towards the macula but do not invariably cause visual loss as they grow more slowly and may involute spontaneously.

The location and angiographic characteristics of neovascular systems are used in determining the approach to management. Away from the macula they are described as **peripheral** or **juxtapapillary**. In the macula, but lying more than 200 microns from fixation, they are defined as **extrafoveal**. They are **juxtafoveal** or **subfoveal** when immediately adjacent to, or under, the foveola. Neovascular systems with well defined leakage seen on fluorescein angiography are described as **classical** and those with ill defined leakage are considered **occult**. Some complexes are **mixed** with both classical and occult components.

Polypoidal choroidopathy.

A form of vascular change that may be confused with AMD has recently been described in which haemorrhagic pigment epithelial detachments are associated with angiographic varicose complexes at a choroidal level. These are best seen on indocyanine angiography. The lesions of polypoidal choroidopathy⁵¹⁻⁵⁴ were first described in black middle aged women but can occur in any racial group. Lesions may subside spontaneously or be associated with recurrent haemorrhages leading ultimately to severe visual loss.

Management pathway

Despite a growing interest in AMD the options for treatment remain limited. Treatment is mainly targeted at the neovascular form of the disease using laser photocoagulation. As the course of AMD, as opposed to ARM, can be highly variable, and the final outcome dependent on the treatment and support offered it is appropriate for an ophthalmologist with a special interest and experience in the care of AMD to be involved from an early stage.

For the majority of patients the main management option remains the provision of low vision aids by the hospital or optometric services and community support with partial sighted or blind registration as appropriate. The provision of low vision care has been addressed in a separate College report published in 1998.⁵⁵

The value of routine screening, given the lack of effective treatment, is unproven. There may be a case for self assessment, using an Amsler Grid, in those patients with high risk of neovascular disease which includes those with large soft drusen and pigment hyperplasia and those with established exudative AMD in one eye.

Mild low risk disease (ARM) requires no special management and, coming on slowly, can be managed in the community. Optometrists would seem to be well placed to carry out routine examinations and offer advice about the value of magnification and lighting. Optometrists can reassure patients with minimal symptoms or signs of ARM and should not refer further. Referral from the primary sector usually occurs when visual impairment begins to interfere with normal lifestyle. Referral is indicated when:

- There is rapidly developing visual failure but still reasonable vision suggestive of exudative disease that might benefit from urgent assessment and laser treatment.
- There is significant visual loss needing accurate diagnosis.
- There is significant visual loss needing partially sighted or blind registration.

General practitioners and optometrists need to be aware of the urgent nature of referrals for patients with recent onset of distortion and visual loss (less than a month) and who still have reasonably good vision (6/12 or better).⁵⁶ Such patients may still have treatable disease and should be referred urgently to either the ophthalmic casualty department or to the out patient clinic following discussion with the local ophthalmologist. This is particularly true for the second eye when the other eye is already involved. In the elderly population with AMD concurrent ophthalmic disease, such as cataract and glaucoma, may also frequently occur and needs to be identified and treated appropriately.

The management pathway will involve the following stages and it is important that the resources and personnel to achieve these are properly funded:

1. Diagnosis and assessment of macular disease including angiography and exclusion of other treatable causes of visual failure.
2. Treatment by laser photocoagulation or otherwise as appropriate.
3. Rehabilitation including
 - a) Provision of suitable optical aids in the primary or secondary sector and training in their use.
 - b) Completion when appropriate of the form BD8 (BP1 in Scotland, A 655 in Northern Ireland) and referral to Social Services (Appendix 2).
 - c) Counselling and rehabilitation within the hospital and statutory or voluntary services in the community.

i) Diagnosis and assessment

History.

Pointers to macular degeneration include recent change in visual function particularly affecting reading, face recognition and difficulties with change of lighting. A dark patch that rapidly fades may also be recognised on waking. Distortion is a feature of macular disease in contrast to the ghosting, doubling or multiplication of images associated with cataract. If the change is recent and rapid, sub retinal fluid associated with neovascularisation is often the basis for the disturbance. This is in contrast to the gradual decline that reflects developing atrophy.

Examination.

Snellen distance acuity and near vision should be recorded. The corrected Snellen acuity does not normally improve with the use of a pin hole in macular disease. Amsler grid examination reflects change lying within the upper and lower temporal arcade vessels, identifies the areas of involvement and establishes a base line for future comparison. Slit lamp fundus examination of both eyes, usually with an indirect or contact lens, confirms the diagnosis and provides clues as to the location of any neovascularisation. Such clues will include small areas of sub-retinal fluid, exudate, haemorrhage or pigment epithelial elevation. The presence of co-existing conditions such as cataract, glaucoma and corneal disease should be sought.

Angiography and colour photography.

Fluorescein angiography, which is available in 96.4% (189 out of 196) of UK eye departments recently surveyed,⁵⁷ will confirm the findings and provide the basis for subsequent management. It is usually performed by a trained ophthalmic photographer.

Whilst colour photography alone may suffice as a clinical record intravenous fluorescein angiography is indicated when:

- There is a need to confirm the diagnosis of exudative macular degeneration as suggested by the symptoms and clinical findings.
- There is a need to define the exact location of any neovascular tissue and, if well defined (classical), to determine the precise area to be treated by laser photocoagulation.
- There is a need to detect persistent or recurrent neovascular tissue following previous laser treatment. Sometimes this may be needed to reassure an anxious patient fearing further neovascular growth.
- There is unexplained visual loss requiring further evaluation.

Angiography may also be justified to provide permanent records and for teaching or research but should only be undertaken with fully informed consent and due consideration of the risks.

The risks of fluorescein angiography⁵⁸ should be borne in mind, particularly when assessing individuals with a history of atopy or a previous reaction to the dye. Apart from the yellowing of the skin and urine, about one in ten suffer some nausea and retching. The more serious complications of anaphylaxis and collapse are much rarer occurring in less than 1 in 2,000. Death, whilst extremely rare, is reported in one in 1-200,000. Staff should be trained in basic life support and emergency drugs should be readily available in the photography department.

It is appropriate that information is available to patients undergoing angiography preferably in accessible leaflet form (currently available in 123 departments or 68%). An example is seen in Appendix 3. Whilst the provision of information is probably more important, the issue of signed consent (obtained in 1998 in 118 UK departments or 62.4%)⁵⁷ must be considered and agreed with the Trust concerned.

Intravenous fluorescein injection can be done by anyone designated to do so, subject to certification of competence, provided the ophthalmologist is responsible for ordering the test and for ensuring that all reasonable safety precautions are observed. The use of nurses may provide opportunities to streamline an angiographic service making it more accessible and effective. Nurse led fluorescein administration was performed in 57 departments in 1998 (30.1%).

Angiography should be available with a minimum of delay particularly given the rapid growth potential of any neovascular lesion. As the angiographic features may progress rapidly, laser treatment should be undertaken within 48hrs of the latest angiogram if at all possible. Time savings in obtaining an early angiogram for study will be achieved by the use of digital rather than conventional angiography (available in 35 UK departments in 1998). Whilst the capital outlay may be higher, the saving on photographic time and consumables will be considerable and there is the added advantage that angiograms are immediately available. Such a digital system will also attract other uses for research and teaching, and may be adapted for indocyanine angiography.

Indocyanine angiography has a role in the assessment of vascular systems under the pigment epithelium which may be ill defined on fluorescein angiography, and in the assessment of the particular condition of polypoidal choroidopathy.⁵⁹ How far it results in benefit in terms of management remains controversial.⁶⁰ If an iodine based dye is used allergy to iodine and shell fish should be excluded before its use.

It is normal to photograph the central 30 degrees centred on the macula, and all angiography should include views of the second eye. This will allow for comparison in respect of the disease involved and help to exclude other unidentified problems. Stereo photography offers a definite advantage in the clinical information gained and can be achieved by the use of a stereo separator or by displacing the camera from side to side during the study.

Colour photography is routinely undertaken with angiography. It helps to determine the nature of changes seen of the angiogram particularly in defining exudative change and the cause of blocked fluorescence due to haemorrhage, pigment or other cause. Drusen are sometimes much more visible on angiography than colour photography and vice versa.

ii) Treatment

Choroidal neovascularisation is a major cause of visual loss in AMD and one that, when well defined, may be amenable to treatment. Effective treatment protocols for laser photocoagulation have been published⁵⁻⁷ but treatment can be difficult and better undertaken by an ophthalmologist who has a special interest and experience in managing such lesions. Pending the confirmed results of the current prospective treatment trials of radiation and photodynamic therapy (PDT), and their approval for use if appropriate, the mainstay of interventional treatment is that of laser photocoagulation. When first seen, unfortunately, most eyes with choroidal neovascularisation have poorly defined complexes and are untreatable.^{49,61} Argon, or equivalent lasers, are almost universally available in UK eye departments (98.9%). The green argon wavelength (514nm) or yellow (577nm) is used to avoid unnecessary lutein uptake and retinal damage. Yellow light has the advantage of being transmitted more predictably through a nuclear sclerotic lens.

Laser photocoagulation.

In 1982 three studies showed treatment benefit from argon laser photocoagulation when a well defined neovascular complex lay outside 200 microns from fixation.⁵⁻⁷ This is most likely to be the case when the visual acuity is still good (6/12 or better) and the duration of symptoms short (less than a month).⁵⁶ Such situations are, however, rare and occur in only 5-10% of those seen.⁶¹ Despite the initial hopes of treatment it is now recognised that continued growth of the membrane and recurrent disease are major limiting factors for success and occur in about 50% within 5 years after initial successful treatment.^{8,9,56}

Some patients with juxta and sub foveal membranes may benefit from treatment⁶²⁻⁶⁴ Sub foveal treatment produces a marginal benefit at 12 months and a maximal one at 24 months. As treatment destroys the fovea there is an immediate fall in visual acuity that often makes this treatment unacceptable. Any benefit from treating juxtafoveal lesions is limited by their tendency to continue growing. Polypoidal choroidopathy may benefit from treatment and the recurrence of haemorrhage leading to visual loss may be prevented. Any of these treatments should, therefore, only be carried out after careful consideration, detailed explanation and counselling.

Pigment epithelial detachments do not usually benefit from laser treatment⁶⁵ Treatment is frequently complicated by rapid visual loss associated with a pigment epithelial tear or rapid progression of an unrecognised neovascular response. A few neovascular lesions outside the detachment itself or within the 'notch' have been shown to respond favourably to focal laser treatment.⁶⁶ Pigment epithelial detachments occurring in patients under the age of 55 do not require treatment as the prognosis is good.^{46,47}

Neovascularisation can progress with great rapidity resulting in significant visual loss even within a few days.⁶⁷ If, on the basis of new symptoms or clinical examination, choroidal neovascularisation is suspected fluorescein angiography should be performed urgently and

interpreted with a minimum of delay to avoid the risk of irreversible damage and a lost opportunity for laser treatment.^{67,68} Well defined extrafoveal neovascularisation should be photocoagulated following careful explanation of the implications and expectations of treatment that, it is hoped, will reduce, but not eliminate, the risk of severe visual loss. The treatment scotoma produced and possibility of further visual loss should be discussed.

There is evidence from controlled trials that lesions with the characteristics below can benefit from treatment:

- Classic extrafoveal neovascularisation located 200 microns from fixation.
- Sub foveal complexes of less than 1 disc area and with vision of less than 6/24. As any treatment benefit is only fully achieved at 24 months, most ophthalmologists feel that treatment is not justified given the immediate loss of vision produced.

Some juxtapapillary complexes and lesions of polypoidal choroidopathy may also benefit from treatment. Juxtafoveal and sub foveal lesions are treated only after careful consideration.

The recommended treatment protocol usually involves:

- Heavy confluent laser photocoagulation (514nm or 577nm) covering the whole of the angiographic lesion and a margin of 100 microns around it.
- Laser power setting and duration to achieve an intense white coagulum.
- A planned sequence of burns around and onto the lesion avoiding other structures.
- Location of the initial burns to minimise the risk of movement causing an exclamation mark burn up to fixation .

Treatment may require long burns and at a high power level to ablate the membrane adequately. Retrobulbar anaesthesia to reduce extraneous movement is not usually needed and may require the presence of an anaesthetist. Injection complications which, whilst rare, can be serious.⁶⁹ Monitoring by pulse oximetry and intravenous access are necessary in view of the low but significant risk of cardio-respiratory collapse⁷⁰.

Recurrent disease remains the main obstacle to successful management with figures of 10% at 1-2 months, 21% at 3 months increasing to 42% at a year and 53% at 3 years being reported.^{8,9} The optimal review interval following laser treatment is uncertain but the first visit usually occurs at two to three weeks. Clinical examination and angiography are performed at this visit with further treatment if necessary although the best results occur when the first treatment is successful. Thereafter the review intervals increase provided the situation is stable (e.g. 6 and 12 weeks and 3 monthly thereafter). Repeat angiograms are needed if membrane persistence or recurrence is suspected.

Patients should be made aware of the risk of recurrent disease particularly in the first year. A patient's observation of subjective change or on the Amsler Grid should not be overlooked as it may indicate recurrence.⁷¹ Patients should have easy return access to the ophthalmologist both for their treated eye but also for the other eye which is at significant risk^{41,43} of similar disease. Patients are also more likely to present earlier should disease in the second eye occur at which stage a developing lesion may be more amenable to treatment. Patients and all staff should be aware of this and direct access may be needed to avoid missed treatment opportunities.

Newer treatments.

More recently a number of alternative managements have been proposed and have or are being subjected to clinical trial. These include:

- Alpha interferon which was not shown to be beneficial in a controlled study.⁷²⁻⁷⁶
- Photodynamic therapy using a photosensitising dye has been subject to a multicentre prospective study.⁷⁷⁻⁸² The findings imply some improvement in visual outcome at one year if more than 50% of the neovascular complex is classical. The high costs of this treatment may not prove generally acceptable and will be subject to considerable further discussion.

- Ionising radiation by external beam application is the subject of several studies.⁸³⁻⁸⁶
- Surgical removal may have some value in idiopathic disease and that associated with the presumed histoplasmosis syndrome but much less so for membranes associated with AMD.⁸⁷⁻⁹⁰ Although some authors have reported benefit from surgery good reading facility is rarely achieved.
- Surgical translocation of the central retina with simultaneous membrane ablation is subject to ongoing study.
- Vitamin and dietary supplements including the use of zinc and selenium that have not proved helpful.^{36,37,91,92}
- Prophylactic laser treatment causes the disappearance of drusen but has also been shown to provoke neovascular complications.⁹³⁻¹⁰⁰ It is undergoing further evaluation in multicentre clinical trials.

Management of co-existing disease.

Macular degeneration may co-exist with other conditions. Studies have shown that both AMD and cataract are common in the elderly each being present in almost half of those over the age of 75.¹⁰¹ It is not surprising that for about a quarter of the population both coexist. Given the changes in threshold for cataract surgery¹⁰² such surgery is not always contraindicated in the presence of macular degeneration. The improved clarity and illumination can be significant even if central acuity remains affected. There is, however, a small risk of the neovascular process being accelerated by surgery that should be kept in mind.¹⁰³

Similarly aggressive glaucoma treatment may be justified to forestall peripheral field loss adding to the central failure. The constraints of clinical governance should not prevent surgery being offered with each clinical situation being judged and managed on its own merits.

iii) Rehabilitation

All patients losing vision due to AMD will suffer significant loss of independence be it through the inability to drive, to read or to manage their own affairs. The early provision of advice and support will encourage independence and minimise the socio economic isolation that AMD causes. Care in the community involving the family, statutory social services, patient or disease centred voluntary services is, therefore, vital. Often but, not invariably, this is triggered by visual handicap registration. The pattern of help available around the country is very variable and the attention given to sight loss in community care plans diverse.¹⁰⁴ There is a need for greater public awareness of AMD and a more uniform standard of care in which ophthalmologists must have a central role working with the statutory and voluntary sectors to achieve this.

Provision of low vision aids.

Arrangements for the provision of low vision aids and initiation of rehabilitation should be integral to the advice and care provided by an ophthalmologist. The recent College document⁵⁵ on the provision of low vision care has defined a person with low vision as someone 'who with a normal correction is not able to perform those visual tasks needed for vocational, avocational and social needs'. Almost all patients suffering visual loss due to AMD may be helped by visual aids. Optical aids involve high powered reading additions, magnifiers, illuminated magnifiers and telescopes. Electronic aids include closed circuit television or specialised adaptations of existing systems e.g. computer software. Non-optical aids include lights and typoscopes.

Different models of low vision aid provision exist around the country involving ophthalmologists, optometrists and low vision therapists.⁵⁵ In 1998 178 eye units in the United Kingdom (90.8%) had some form of low vision aid service. The remainder had access to local providers. Nationally the availability of LVA services in general was very uneven when surveyed in 1999.^{105,106} Patient acceptance and improved ability in the use of aids has been demonstrated when full support and training are given. A range of aids may be needed to meet specific tasks. It is not adequate to issue a patient with a magnifying aid and not provide sufficient after care.

Patients trained in eccentric fixation and the use of better lighting can greatly improve their reading ability.¹⁰⁷

Specialist low vision centres, within or outside hospitals, will be staffed by a multidisciplinary team to assess the low vision and the daily living skills needed. A simpler hospital service involves a visiting low vision therapist who will provide and explain the use of low vision aids and advise on eccentric viewing and lighting. The problems of daily living skills and rehabilitation can also be addressed in a limited fashion. Optometrists in high street practice and some social service and voluntary organisations offer similar provision and advice about aids which will depend on local organisation, interest and skills.

Recently a framework document from the Low Vision Services Working Group¹⁰⁸ has proposed the establishment of Low Vision Services Committees at a local level to address the fragmentation of current services and stimulate multi-disciplinary working to improve communication and differences in care.

Visual handicap registration.

The number of blind people in Britain has been counted since 1851 starting with a simple declaration of blindness on census returns. Ophthalmologists now have a vital role in identifying those with visual handicap (Appendix 2) and initiating the process of visual handicap registration by social services leading to access to the statutory services and allowances available. The form BD8 in England and Wales, BP1 in Scotland and A655 in Northern Ireland also provide the basis for analysis of the causes, incidence and prevalence of visual handicap across the country.

The social and economic benefit to society must be substantial if independence is maintained. When treatment has not proved possible or effective, there are two aspects to rehabilitation. These consist of firstly maximising the residual vision, often employing low vision aids, and secondly providing education and training to enable the patient to lead as normal a life as possible within the limits of the disease. No firm data, however, exist as to the costs and benefits of good management.

Training and coping strategies.

Coming to terms with chronic visual disability either as a result of untreatable disease or following unsuccessful treatment is a depressing and arduous process. Patients with severe visual loss due to AMD often have unrealistic expectations and some patients never adjust to their disability.

Explaining the management of AMD requires patience and sympathy. Patients with AMD greatly benefit from continuing support and information about their condition and all patients losing vision need hope and encouragement. When no specific treatment is available it should be emphasised from the beginning that peripheral vision will be maintained and that there is no harm in using the eyes. Advice with regard to the future prognosis should be an integral part of the management. Often great anxiety with its attendant risk of depression can be relieved by understanding that complete blindness does not occur as a result of AMD.

Utilisation of existing vision can be greatly enhanced by ensuring that objects are bigger, brighter and bolder and that contrast is increased. This may be achieved by such devices as angle poise lamps, larger print and the use of felt tipped, rather than ball point, pens. Liquid level indicators, markers for cooker dials, free directory enquiries, enlarged telephone dial numbers are available as are large print books, bank statements, talking books, newspapers and clocks.

Mobility is aided with the use of either symbol or guide canes and can improve confidence outside the patient's home. Guide dogs are rarely of benefit for patients with AMD although they are entitled to apply for one. A home visit from a low vision therapist will often provide the basis for useful advice.

Statutory and voluntary support services in the community.

The changes associated with care in the community and boundary changes have altered the role of the statutory social services. They and the new primary care groups or their equivalent now

have a greater role as the purchasers of care. Training and rehabilitation courses for those recently registered as visually handicapped and others with vision difficulties are provided by social services and blind associations . Such courses will include the elements of a low vision rehabilitation service.

Further support and advice are available in information documents, tapes and large print material from the national organisations such as the Royal National Institute for the Blind or from local charitable blind associations. Disease focused societies such as the Macular Disease Society provide a useful source of information for those affected by AMD. A list of a number of these bodies is in the appendix 4. With the predicted increase in the older population over the next 20 years the effect of macular degeneration remains daunting. The greater co-operation developing between all those involved provides the hope of a more focused and effective service in the future.

Appendix 1

Goals and objectives for the management of macular degeneration

The development of clinical guidelines and good practice statements provide a basis for clinical governance and for measurement of practice and its audit.

The following should be the national aim of an effective service.

- Good patient data with regard to risk factors and disease characteristics.
- Recognition by the purchasers of service (Primary Care Groups or their equivalent) of the significance of sight loss and its amelioration by treatment and support.
- An improved patient and public awareness of macular degeneration and the pointers to its development.
- Even access to care across the country. Such care should enable the early recognition of impending disease within the primary sector and its early referral to achieve optimal treatment benefit.
- Timely response within the ophthalmic community to minimise the visual morbidity resultant from macular degeneration. This may, in turn, demand concentration of resources both in terms of equipment and ophthalmic and other personnel.

The following should be objectives for the management of an individual patient and could provide the basis for audit.

Suspicion of developing AMD:

- Urgent referral if there is recent onset of distortion and dropping vision. A telephone call may be needed to determine urgency in individual cases. A patient at risk should be seen as soon as possible and preferably within a week if a neovascular membrane that might be treatable is suspected.
- Referral resulting in ophthalmic assessment within 3 months for non urgent cases with the identification of any other disease or specific risk factors.

Management of a treatable neovascular complex:

- Examination by an ophthalmologist with knowledge and experience in the care of patients with AMD.
- Fluorescein angiography to be reviewed and used as the basis for treatment.
- Careful explanation and counselling.
- Laser treatment within 48 hours of the angiogram, if at all possible. Delay after this time may necessitate further angiography to exclude progression.
- Review 2 - 3 weeks following laser treatment with repeat angiogram and if needed re-treatment. Review thereafter is as appropriate.

Management of untreatable AMD in one eye or following unsuccessful treatment:

- Careful explanation by the ophthalmologist at the time of diagnosis as to the nature of the problem.
- Advice and counselling about risks for the other eye and how to identify developing disease.
- Indication as to how to obtain further information and how to seek urgent help should the second eye become involved.

Management of bilateral untreatable AMD:

- Careful explanation by the ophthalmologist at the time of diagnosis as to the nature of the problem.

- Advice and counselling about future visual function and an indication as to how to obtain further information.
- Early visual handicap registration and referral for low vision aid assessment within 13 weeks or earlier as appropriate.
- Provision of advice and support in the community at an early stage in keeping with local arrangements. This should follow an initial contact or visit being made by Social Services, or voluntary agency for the blind, within a month.

It is essential that a full assessment of need is undertaken and the appropriate support provided. It is likely that the patient will need to be seen and visited at home to achieve this.

Appendix 2

Criteria for recommendation for partially sighted or blind registration¹⁰⁹

Partially sighted:

There is no legal definition of partial sight. The guidelines are that a person can be certified as partially sighted if they are:

Substantially and permanently handicapped by defective vision caused by congenital defect or illness or injury.

As a general guide this will apply when the following apply:

- 3/60 to 6/60 Snellen with a full field.
- Up to 6/24 Snellen with moderate contraction of the field, opacities in media or aphakia.
- 6/18 Snellen or better if there is a gross field defect, for example hemianopia, or if there is marked contraction of the visual field, for example in retinitis pigmentosa or glaucoma.

Blindness:

The National Assistance Act 1948 says that a person can be certified as blind if they are:

So blind that they cannot do any work for which eyesight is essential.

This will generally apply when:

- The visual acuity is below 3/60.
- The visual acuity is between 3/60 and below 6/60 when there is a very contracted visual field.
- The vision is 6/60 or better when there is a very contracted visual field especially if the contraction is in the lower part of the field.

Other points to consider relate to how recently the person's eyesight has failed and the person's age at which the eyesight failed.

Appendix 3

The following is a suggested outline describing fluorescein angiography. Headings should be boxed. The text should be in a font size of 16 and in bold to facilitate reading.

FLUORESCEIN ANGIOGRAPHY.

A description for patients

What is fluorescein angiography?

This is a simple test to give your doctor more information about the condition of the back of your eye. It helps decide the best form of treatment or management.

What does the test involve?

When you arrive at the out-patient department your eyes will be tested. You will be asked a few questions about your general health. Drops will be put into both eyes to dilate your pupils. The drops may blur your vision for a short time. It is, therefore, advisable that you do not drive yourself for the appointment. It is important that you let us know if you have any allergies, or if you have had an unwanted reaction to fluorescein before,

Once your pupils are dilated you will be taken into the Angiography room. Photos will be taken of the back of your eye using a special camera. Then a small amount of dye will be injected into a vein in your arm. Within seconds the dye travels in your blood to the blood vessels in your eye. Your eye is then photographed to give more information about the condition of the back of your eye. No X-rays or radioactive substances are used. The eye is not touched during the test. The actual test takes about 10 to 15 minutes. Following the test we ask you to stay in the department for about ½ hour to check that you do not have any side effects and are all right to go home. If you are elderly or have a long way to come it is advisable to bring someone with you.

Would it be all right to have the test if I am on tablets?

Yes, it is all right to take any tablets or medicines as usual on the day of the test.

Is it all right to eat and drink before the test?

Yes, you can eat or drink what you like before the test.

Are there any side effects?

The dye will give your skin a yellow tinge and your urine will be bright yellow for one or two days. There may be some blurring of vision caused by the drops and some dazzle from the camera flash. One in ten patients feels slightly sick or short of breath but the feeling rarely lasts more than a few seconds. If, in rare cases, patients have severe breathing or circulatory difficulties the emergency team will be called. Although extremely rare, a few deaths have been reported in the past.

When will I know the results?

You may not be given the results of the test straight away. The results will be given to you at your next appointment. Please check that you know when your next appointment is. Staff in the department will be happy to assist you.

Appendix 4

Some useful addresses:

Local Blind Associations.

Addresses should be obtainable locally or through the RNIB

Royal National Institute for the Blind,
224, Great Portland Street,
London, W1N 1AA

0207 388 1266

The Guide Dogs for the Blind Association.

Hillfields,
Burghfield, Reading, Berks, RG7 3YG

01734 835555

The Macular Disease Society,

PO Box 247,
Haywards Heath, West Sussex, RH17 5FF

0990 143573

The Partially Sighted Society,

Queens Road,
Doncaster, South Yorkshire, DN1 2NX

01302 323132

National Association for the Education, Training and Support of Blind and Partially Sighted People (OPSIS).

Court Oak Road,
Harborne, Birmingham, B17 9TG

0121 428 5037

Talking Newspaper Association of the UK,

National Recording Centre,
Heathfield, East Sussex, TN21 8DB

01435 866102

Calibre,

Aylesbury,
Bucks, HP22 5XQ

01296 432339.

RNIB Talking Book Service

Mount Pleasant
Wembley, Middx HA0 1RR

0208 903 6666

A list of the independent services available for the blind and visually impaired is available from The Royal College of Ophthalmologists.

Appendix 5

Glossary of terms:

Age Related Maculopathy (ARM):

A disorder of the macular area, most often clinically apparent after 50 years of age, and characterised by:

- discrete whitish-yellow spots identified as drusen.
- increased pigmentation or hyperpigmentation associated with drusen.
- sharply demarcated areas of depigmentation or hypopigmentation of the retinal pigment epithelium and associated drusen.

Age-Related Macular Degeneration AMD (ARMD):

There is no universally accepted definition of this term. The late stages of ARM are identified as Age Related Macular Degeneration (AMD) which may be 'wet or dry' and feature:

- geographic atrophy with visible underlying choroidal vessels.
- pigment epithelial detachment with or without neurosensory detachment.
- sub-retinal or sub pigment epithelial neovascularisation.
- fibroglial scar tissue, haemorrhages and exudates.

These changes lead to progressive central visual loss and worsening function in the elderly.

Disciform Scar:

Sub-retinal fibrovascular tissue, often part of the healing response following choroidal neovascularisation.

Drusen:

Yellowish excrescences external to the retinal pigment epithelium that are well defined small deposits (hard drusen) or ill defined deposits (soft drusen) lying between the basement membrane of the retinal pigment epithelium and Bruch's membrane. Drusen are the ophthalmoscopic and histological hallmark of age-related change at the level of Bruch's membrane. They may be discrete, sub-confluent or confluent in configuration.

Extrafoveal Choroidal Neovascularisation:

Choroidal neovascularisation that is no closer than 200 microns from the centre of the foveal avascular zone as judged by fluorescein angiography.

Exudative Macular Degeneration:

Manifestations of choroidal neovascularisation and/or pigment epithelial detachment in a patient with AMD and may be referred to as being 'wet'.

Geographic Atrophy:

One or several areas of well demarcated zones of apparent atrophy of retinal pigment epithelium. Drusen are usually present as well and are often crystalline.

Juxtafoveal Neovascularisation:

Choroidal neovascularisation that is closer than 200 microns from the centre of the foveal avascular zone but that does not reach the centre of the foveal avascular zone.

Macular Photocoagulation Study (MPS):

A series of ongoing multicentre clinical trials funded by the National Eye Institute that are investigating the value of laser photocoagulation for patients with exudative AMD.

Non-exudative Macular Degeneration:

Macular changes characterised by drusen, pigment changes and atrophy but not serous elevation of the neuroretina associated with choroidal neovascularisation or pigment epithelial detachment.

Pigment Epithelial Detachment:

Accumulation of fluid ('serous pigment epithelial detachment') or blood ('haemorrhagic pigment epithelial detachment') beneath the retinal pigment epithelium. Associated choroidal neovascularisation is usually present in older patients.

Retinal Pigment Epithelial Changes:

These are either i) atrophic changes of the pigment epithelial-Bruch's membrane complex that lead to an appearance of hypopigmentation, or ii) hyperplastic changes of the retinal pigment epithelial-Bruch's membrane complex that lead to an appearance of hyperpigmentation.

Soft Drusen:

These drusen are larger than hard drusen and usually have ill-defined, non-discrete margins. Histologically, these represent diffuse deposits lying between the basement membrane of the retinal pigment epithelium and Bruch's membrane. They are often sub-confluent or confluent in their distribution.

Subfoveal Choroidal Neovascularisation:

Choroidal neovascularisation that involves the centre of the foveal vascular zone.

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