

Ocular Disease: shared care and co-management

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Sharing the management of cataract

See handout to cataract lecture 1 and 2

Refractive surgery

Refractive surgery has become increasingly popular in the last 10 to 15 years such that it is almost a high street commodity in westernised countries. Nonetheless, despite increasingly good results, refractive surgery still has limitations and risks. In a number of countries in which relations between the two tribes, optometry and ophthalmology, have occasionally been strained, such as the USA and Australia, the rapid expansion of refractive surgery has brought together increasing professional collaborations and rapport between these professional groups.

Optometrists have a key role in assessing the suitability of potential patients and followup of those of who have undergone refractive surgery. These roles include patient education, clinical knowledge of suitability for correction, a contemporary understanding of types of intervention, an appropriate mode of referral, as well as clear, ethical, and appropriately structured guidelines for shared or co-management.

Increasingly, subjects interested in refractive surgery have already been exposed to advertisements, advertorial's, internet sites and other media information in regard to the pros and cons of refractive surgery. Unfortunately, such information is often less than unbiased, and therefore it is essential that all eye care practitioners are up-to-date with the latest data in regard to increasingly sophisticated techniques. Criteria for suitability for treatment varies from centre to centre, however, most suggest a minimum that includes: an age of 20 or more, stable refraction of at least two years duration, and a contact lens free period prior to surgery of sufficient time to enable topographic stability and absence of contact lenses related warpage.

An earlier lecture has already discussed the types of refractive surgical intervention which might be considered including PRK, LASIK, LASEK and intraocular interventions such as phakic IOL and clear lens extraction. However, in relationship to follow-up, this discussion will be restricted primarily to LASIK.

Co-management of the LASIK patient

Any optometrist involved in the post-operative care of LASIK patients should preferably have a top-quality slit-lamp that includes x25 to x40 magnification options, ideally this should be accompanied by digital anterior segment photography facilities and computerised corneal topography is essential. Digital images of the anterior segment and topography can readily be emailed to the ophthalmic surgeon for opinion, comparison and inclusion in case notes.

Obviously, there are complications, or undesirable outcomes, common to all refractive surgery techniques, such as deviation from the target intended refraction and unexpected visual symptoms. Complications can, somewhat arbitrarily, be divided into those that are acute i.e. in terms of hours or days, and those that are sub-acute or delayed in terms of a week to months.

Acute complications of photorefractive surgery include severe pain, infective keratitis, diffuse lamellar keratitis (Sands of the Sahara) and flap displacement or wrinkles. With the exception of pain, which can often be managed conservatively, these other acute complications all require immediate referral to the operating surgeon.

In terms of the target refraction, best spectacle corrected visual acuity (BSCVA) is usually maintained for around 98% of photorefractive surgery cases, although loss of one or two lines of BSCVA is not uncommon in the first week post surgery. However, good unaided visual acuity in the region of 6/6 to 6/12 is usually expected within 24 to 48 hours, indeed, in low myopic corrections, patients may obtain 6/6 unaided vision within a few hours of surgery. Best spectacle corrected visual acuity of less than 6/9 persisting for more than the first few days post-operatively should certainly make the experienced practitioner look carefully for a cause and consult with the operating surgeon. Of course, changes in vision may be associated with refractive regression which is maximal in the first month, but can continue for up to three months.

TABLE 5. Management of LASIK patients. Conditions requiring referral back to operating surgeon. In the co management set-up the criteria for urgent or non-urgent referral will have been the subject of a written protocol between the involved parties, however, the following table serves as a general guide.

Urgent referral	Non-urgent referral
Significant pain	Refractive under/overcorrection
Flap displacement	Decentred ablation
Flap wrinkles	Central topographic island
Interface keratitis (DLK)	Loss of 2 lines of BSCVA beyond 1 week
Infective keratitis	Residual error of $\geq \pm 1.00D$
Loss of ≥ 3 lines BSCVA	Induced astigmatism $\geq 0.75D$
	Epithelial ingrowth
	Dry eye symptoms
	Recurrent corneal erosion

Any practitioner seriously interested in co-management of refractive surgery patients must have access to computerised corneal topography. Computerised topography can reveal features such as irregular ablations, decentred ablations, and central islands (now rare) which are not immediately apparent on slit lamp inspection, but can give rise to chronic visual symptoms.

As already noted, significant regression of refractive effect may occur in a minority of patients and this natural and variable phenomenon may be considered by some as a "complication", correspondingly all subjects should be aware of the possibility of regression pre-operatively and the possible need for a second treatment to refine the refractive end-point.

Three relatively common complications that can be troublesome, but seldom affect vision, are: exacerbated dry eye disease, micro recurrent erosions, and epithelial ingrowth under the flap. Fortunately, post-LASIK dry eye symptoms and micro recurrent erosions will respond to appropriate use of topical lubricants. Furthermore, minor epithelial ingrowth, of 1 mm or less from the LASIK flap edge, generally does not require any intervention. Indeed, in the absence of visual symptoms, induced topographic change, local flap melt (keratolysis), or progressive epithelial ingrowth, this latter complication seldom requires surgical management.

Longer-term symptoms which may require careful assessment, appropriate refractive correction, and possibly therapeutic intervention include night-time glare and halo and "early onset" presbyopia in myopic subjects who have been pushed into low hyperopia.

Referral for retreatment or enhancement

The incidence of re-treatment or enhancement varies from 3 to 10% or thereabouts, and different practitioners have variously recommended enhancement between one and six months post LASIK. However, since most practitioners believe, with the exception of extreme myopic corrections, that refractive stability is obtained by around 10 to 12 weeks, that this is the most suitable time to consider enhancement or re-treatment.

Delayed complications - Keratectasia

Although first described in the scientific literature less than five years ago, the recognition of keratectasia after laser in situ keratomileusis (LASIK) and, to a lesser extent, after photorefractive keratectomy (PRK), is a cause of concern amongst refractive and corneal surgeons. The condition causes delayed onset, progressive, ectatic corneal thinning and steepening, usually after an otherwise uncomplicated LASIK procedure. This appearance leads to the conditions other name, iatrogenic keratoconus. It is best identified by Orbscan II technology as highlighted in an earlier lecture.

Keratectasia has been reported to occur from one week to three years after LASIK. It is this latency that helps to define the condition, but also means that the true incidence presently remains unknown. This clearly distinguishes it from post-PRK or post-LASIK 'central topographic island' formation, another cause of central corneal steepening. Central islands are present immediately post-treatment and tend to resolve or improve with time, but certainly do not progress. That keratectasia can present late – perhaps many years after apparently successful treatment - means that true incidence will only become clear with time.

Theories on the aetiology of keratectasia can be divided into 3 three main groups. The first being the presence of unidentified keratoconus prior to treatment. Keratectasia in this scenario represents progression, although probably accelerated, of the underlying condition. The second group consists of eyes which, for a variety of reasons, have been left with an inadequate thickness of stromal bed after treatment. The third, and perhaps most worrying group, are those eyes that are not keratoconic and do not have inadequate residual stromal bed thickness, such that their keratectasia is truly idiopathic.

Ethical issues

The co-management of refractive surgery patients is fraught with potential ethical conflicts. Some of these have been challenged in the UK, USA and Australia. For instance, should an Optometry practice which owns shares in a refractive surgery centre refer subjects to that centre - how do practitioners tackle this conflict of interest and how can potential patients be fully informed in a transparently unbiased fashion? Whilst the question about whether optometrists should be paid a fee for simply referring patients for refractive surgery begs the obvious answer i.e. that clinical referrals cannot and should not be bought or sold, the manner of alternative payments muddies the water. For instance, it has been suggested that in some shared care scenarios the subject is encouraged by the refractive service to be reviewed by the referring optometrist at one, two, three and six months post bilateral LASIK, with the fee for service payment at each visit being 2-300% the cost of a normal, full optometric consultation. In effect this may be construed as a fee for referral since it cannot be justified on the basis of professional services provided. Ultimately, when untoward outcomes occur, the optometrist and the refractive surgeon may be jointly sued and lines of responsibility with clearly written protocols should be adopted before entering into shared care of refractive surgery patients.

Shared care: Keratoconus and corneal transplantation

Keratoconus is a bilateral non-inflammatory corneal ectasia, the exact cause of which remains unknown. The diagnosis is usually made by optometrists and management of the majority of patients remains within the remit of the community optometrist. The aetiology is probably multifactorial, or it represents the final common pathway for a variety of different pathological processes. In an, as yet unknown proportion of patients, one of the aetiological factors is certainly genetic. Evidence for this is suggested by the condition's familial occurrence, its discordance between monozygotic and dizygotic twins, and the association with other known genetic disorders. However, exactly how the condition is inherited and then leads to ocular morbidity or interaction with other suggested co-pathologies, remains unknown. Keratoconus occurs in late puberty, it is generally bilateral and has variable progression which may be rapid, gradual, or intermittent. Generally, progression occurs mostly between 10 and 30 years of age. Is thought to be an autosomal dominant inherited disease, with a family history being present in 5% of subjects. There are also strong associations with atopy and with eye rubbing. Twin studies and genetic associations have highlighted links with Down's syndrome, Marfan's syndrome, Ehlers-Danlos syndrome, mitral valve prolapse (>40%) and Leber's congenital amaurosis (30%).

As already noted, the initial diagnosis of keratoconus is usually made by optometrists, and in the past this was largely based on the retinoscopy reflex, keratometer readings and mires, and classical slitlamp signs such as Vogts striae and Fleischers iron ring. Computerised topography has been added to this armamentarium in the last 15 years. A number of features should suggest the possibility of keratoconus on topographic assessment: central topographic power above 47 dioptres, more than one dioptre asymmetry in the apical power, an elevated surface asymmetry index (SAI), and inferior corneal steepening with a high I-S ratio. Whilst Placido based systems perform this task more economically, combined Placido and slit scanning systems such as Orbscan II provide wide-field pachymetry information in addition to keratometric maps.

Referral for corneal transplantation

Corneal transplantation has been attempted in a variety of forms for almost 200 years, but it was not until 1905 that the first report of a successful human corneal transplant was recorded by Edward Zirm. Fortunately, the majority of patients with keratoconus will enjoy a lifetime correction with spectacles or contact lenses, and only 10 to 20 percent of subjects go on to require a corneal graft. None-the-less, in most developed countries keratoconus remains the most common indication for penetrating keratoplasty. The level of vision demanded for social and professional activities obviously varies significantly between individuals, but as a "rule of thumb" most UK surgeons would consider that when BSCVA falls below 6/12 with contact lenses that referral for consideration of corneal transplantation should be made.

High levels of success at five years have been reported for transplantation in keratoconus, with 80-95% of eyes maintaining clear and functioning grafts. Interestingly, a ten-year study of indications for transplantation by the New Zealand National eye bank highlighted that keratoconus accounted for almost half of all the indications for surgery. In the middle year of the this study (1995), comparative data from the Eye Bank Association of America (EBAA) ranked indications for penetrating keratoplasty as: 1. non-specified (21.5%), 2. pseudophakic corneal oedema (20.5%), 3. corneal ectasias/thinning (12.3%) and 4. endothelial corneal dystrophies (11.9%), whereas, combined indications for re-graft totalled 10.4% and aphakic corneal oedema 5.6%. Whilst, in the NZ study the overall rate of PKP is lower than might be anticipated for the population of New Zealand, as a percentage of overall indications for PKP during 1991-99, combined pseudophakic and aphakic bullous keratopathy (17.9%) is much lower than that recorded by the EBAA (26.1%). In contrast, in the absence of public healthcare restrictions or surgeon preference for cases with better visual potential (e.g. keratoconus), nor significant

limitation on donor tissue availability, keratoconus as an indication for PKP appears to be almost 4-fold greater in this New Zealand Study.

Management of corneal transplantation and clinical features of acute graft rejection

Following PKP the majority of keratoconus patients should obtain a corrected vision of around 6/12-6/6 within 2-8 weeks depending upon astigmatism. In the immediate post-operative period a topical antibiotic, typically chloramphenicol, may be prescribed QDS for 2-4 weeks. Regimens for topical corticosteroid vary significantly with some surgeons using topical corticosteroids for only 2-3 months, whilst many prescribe a QDS regimen for 6 months or more. On assessment grafts should be entirely clear with a full epithelial cover and virtual absence of anterior chamber activity within 2 weeks. Any loose corneal sutures can result in mucus accumulation, local keratolysis or even secondary infection and if identified in optometry practice this should lead to immediate referral for removal.

Since potent topical corticosteroids are employed for up to several months, IOP should be assessed at all reviews to identify any steroid-induced IOP elevation. An IOP greater than 24mmHg should initiate a non-urgent referral back to the ophthalmic service and an IOP greater than 30mmHg should be treated within a week or two by anti-hypertensives and/or adjustment of the corticosteroid regime.

The commonest reason for failure of corneal grafts is allograft rejection. Even in lower risk grafts there tends to be a 20 percent prospect of rejection and this may rise to 50 percent, or more, in vascularised and high-risk grafts. The observant patient will often be the first to detect the symptoms of rejection in most cases, and the well-informed subject will present early, at which point rejection can often be reversed. However, initial presentation could be to the patients own community optometrist and the key clinical features must be identified.

Key symptoms of rejection that should institute urgent referral include: redness or pinkness of the eye associated with mild ocular discomfort or photophobia. As rejection progresses there will be loss of visual acuity, but it is obviously preferable to pick up the rejection before significant visual loss has occurred since loss is related to developing corneal oedema, a feature of endothelial decompensation which becomes progressively less reversible.

At the slit lamp, early features include subtle flare and occasional cells in the anterior chamber with minimal ciliary flush. More advanced rejection is typically associated with keratic precipitates on the endothelium and varying degrees of corneal oedema. All cases of presumed rejection should be referred for urgent assessment and treatment. A number of other clinical features will be highlighted in this presentation.

Managing post-graft ametropia and astigmatism

In the past a clear corneal graft was often thought to be the best marker of success, however, the most functional aspect of the transplantation process, i.e. the ability to maximise BSCVA, has become increasingly important with advances in refractive surgery and the increased visual demands of the computer age. Ametropia, in the form of myopia is relatively simple to correct optically, however, the singular refractive problem associated with corneal transplantation is that of high or irregular astigmatism that requires a rigid contact lens fit or surgical intervention.

A number of aetiological factors contribute to high post graft astigmatism and these include: high preoperative astigmatism (as in keratoconus), the relative shape of the donor cornea to the recipient corneal bed, the size of the graft in terms of distance of the graft host junction from the optical zone, antero-posterior wound misalignment, asymmetric wound healing, and the method

of suturing. There are a number of different techniques of corneal suturing but contemporary techniques all have in common the facility to adjust or remove the sutures to maximise the reduction in graft astigmatism.

Using a combination of a continuous suture and twelve interrupted sutures, a study by McGhee et al demonstrated that a mean 2-3 month post-operative astigmatism of 3.71D could be reduced, by selective removal of 1-2 sutures at two to three months post surgery, to a mean of 2.23D, thus enabling provision of a practical spectacle correction in all cases.

However, all experienced corneal graft surgeons are acutely aware that once all sutures are removed, at 12 to 18 months post graft surgery, that there is a relatively unpredictable change in astigmatism which may result in this being greater, or less, than with all sutures in position. Indeed, a study by Kirkness et al demonstrated that following transplantation surgery for keratoconus, the mean astigmatism was 5.6D. A number of other authors have reported post-graft astigmatism, for a variety of indications, with the mean being generally between 3.1 and 5.4D. Keratoconus is generally associated with higher post-graft astigmatism than non-ectactic indications for surgery.

Routine re-referral to ophthalmological care should be considered for all refractive errors that cannot be corrected appropriately and comfortably with spectacles or contact lenses. Generally, most surgeons would consider intervention for astigmatism of greater than 5 or 6 dioptres that is not correctable by optical means.

Surgical correction for post-graft astigmatism

A number of different techniques can be utilised to manage post-graft astigmatism, obviously, fundamental amongst these is the use of RGP lenses. However, occasionally the magnitude of astigmatism is too great to obtain a comfortable contact lens fit, or the individual is too intolerant of contact lenses. Fixed depth relaxing incisions have been used by a number of authors and these have been shown to reduce astigmatism by around 60 percent. In a study by Koay and McGhee a mean preoperative astigmatism of 9.7D, in 34 individual eyes, was reduced to a mean of 3.9D using a standardised single procedure. In contrast surface based examiner laser PARK has a very limited role in the treatment of myopia or myopic astigmatism after corneal graft surgery, indeed, although initial results may be impressive, they are usually associated with regression, the development of significant corneal haze, and loss of BSCVA. Therefore, the combination of PARK and PTK is only useful in a small minority of eyes with modest refractive errors and recurrent anterior membrane dystrophies.

More recently, LASIK has been utilised in the treatment of post corneal transplant myopia and myopic astigmatism. In a second study by Koay, McGhee et al, in regard to the management of post transplantation ametropia, a group of patients with a mean myopia of around 7.0D with a mean astigmatism of 6.8D, were corrected by LASIK to a mean residual myopia of -0.64 D with a mean residual cylinder of -1.9 D. Effectively this represents a 91% reduction in myopia and a 72% reduction in astigmatism, and unlike PRK this was associated with no loss of BSCVA. Other authors have confirmed that in the management of myopia and myopic astigmatism, presuming a normally positioned graft-host junction that does not require many intervention, LASIK has a very useful role.

However in the management of post-graft ametropia, there is no single panacea and optometric referral may result in revision of the graft-host wound, corneal relaxing incisions, or LASIK. Very occasionally, repeat graft may be necessary to rehabilitate eyes that are contact lens or spectacle intolerant.

Screening for Diabetic Retinopathy

Diabetes, and diabetic retinopathy, are becoming increasing problems in westernised societies with more than 150 million people affected world-wide. Diabetes now affects two to four percent of the UK population, with type 2, or non-insulin dependent diabetes, reaching almost epidemic proportions. Importantly, diabetic retinopathy is the commonest cause of blindness in those of working age. Equally importantly, this loss of vision is preventable in many cases.

Recommended screening varies from country to country, but generally where the health service permits, annual or two yearly reviews are suggested for appropriate assessment and follow-up of retinopathy. In the United Kingdom there is limited provision within the hospital service to provide screening which should reach all diabetics, but internationally, never achieves more than 85% of the target group. Other groups such as general practitioners, ophthalmic nurses, and optometrists have been involved in retinopathy screening projects, the latter being better equipped, in terms of training and equipment, than the former groups for this purpose.

Assessment criteria

Essential equipment for assessing diabetics includes a good quality slit lamp, a selection of indirect lenses and preferably a fundus contact lens. Dilated funduscopy is essential for appropriate screening and access to digital or conventional retinal photography is a bonus in documenting any progress in retinopathy.

All reviews should include UAVA, BCVA, IOP, assessment of media – especially for diabetes-related posterior subcapsular cataract - and indirect, eg. 90D lens, funduscopy through a widely dilated pupil (using g.tropicamide 1% and g phenylephrine 2.5% (if response to tropicamide insufficient). Fundi should be carefully examined for microaneurysms, haemorrhages, exudates, cotton-wool spots, new vessels at the disc or elsewhere, and for early signs of macular oedema and a careful retinal drawing made if photography is unavailable.

Diabetic retinal changes can be classified into background, pre-proliferative and proliferative diabetic retinopathy and this classification will be discussed and illustrated in the lecture. Diabetic maculopathy, a fourth subgroup of the classification, can be further subdivided into focal, diffuse, ischaemic, mixed, and clinically significant macular oedema (CSMO).

As previously noted, screening techniques can be by direct or by indirect ophthalmoscopy, although, indirect ophthalmoscopy through a dilated pupil using an indirect, or contact, lens at the slit lamp remains the clinical gold standard. However, other techniques, relying more on technology, have been discussed in an earlier lecture. Indeed, non-mydratic retinal photography is becoming increasingly popular, in part due to the advantages that are conferred by digital photography, including: instant availability for patient education, instant confirmation of quality images, and ease of record storage and rapid retrieval.

Of course, any national guideline will recommended a comprehensive population coverage of a technique with a high sensitivity (>80%) and high specificity (>95%) in the detection of diabetic retinopathy. To facilitate audit of such services, centralised data collection and access is required and there must be agreed clinical criteria and agreed referral processes in place.

In general any minor drop in vision or suggestion of macular oedema, or focal or diffuse exudates or haemorrhages at the posterior pole should result in a non-urgent referral to the HES with a detailed description of findings and corrected vision. In contrast, exudates or CSMO within

a disc diameter of the fovea require more urgent referral and raised new vessels or intravitreal haemorrhages require emergency referral for retinal laser therapy.

Optometric screening of diabetic retinopathy

Optometric screening of diabetic retinopathy has been assessed in a number of studies in United Kingdom and Australasia. A prospective study, involving 27 locally accredited optometrists, carried out in the Wirral, assessed around 5000 diabetics. Some 317 of these diabetics were subsequently referred to the hospital eye service and approximately 30% were found to be false positive. The most common cause for false positive referral was the presence of posterior pole drusen. Approximately ten percent of the "test negative" cases were re-examined, and it was noted that 1.2% of sight-threatening retinopathy had been missed.

In an inner London study, 63 trained and accredited optometrists screened 645 diabetics under the care of general practitioners. Some 586, or 80%, of these subjects were successfully screened and 14% were identified with background diabetic retinopathy, whereas, 2.3% exhibited sight-threatening retinopathy. Interestingly, as a by-product of the study, dilated funduscopy increased from 48% to 56% in general practice. Importantly, no false positives were referred and the diagnosis reached a specificity of 94%.

In Australia, national guidelines have been distributed to a number of those who care for the eyes of diabetics. These guidelines have included a standardised retinopathy chart. In a study of 500 Australian optometrists, conducted after the distribution of these guidelines, it was noted that 90 percent of optometrists acknowledged they had received such guidelines but only 57% had read these guidelines in full. The diabetic retinopathy classification charts obviously proved to be very useful, and two-thirds of respondents noted that they referred to the charts at least once a month. As a benefit, within the optometry group studied, there was generally a reduced fear of inducing acute angle closure glaucoma by dilating pupils, and dilated ophthalmoscopy of newly presenting diabetics rose from 74% to 82%.

From the foregoing it can readily be appreciated that the demand for quality screening of diabetics continues to increase. It is also notable, optometrists have, by default, been involved in such screening for many years. Recent studies have highlighted significant enthusiasm on behalf of the optometric community in regard to involvement in structured screening programmes, and prospective studies have equally highlighted the high quality of screening by properly trained and accredited optometrists.

Screening and co-management of chronic open-angle glaucoma

Optometrists contribute enormously to the detection of chronic, or primary, open-angle glaucoma. There are a number of components to the assessment and management of glaucoma, and these include the initial diagnosis, medical and surgical treatment, and ongoing monitoring of stability or progression of the disease. Chronic open angle glaucoma affects approximately 2% of the population but is increasingly prevalent in older age groups. Follow-up of these patients constitutes the bulk of patients reviewed in hospital eye departments and this has previously been reported as between 10% to 50% of return patients, with a mean of approximately 30%.

In the ideal co-management eye care environment, hospital and community practitioners would have appropriate and identical instrumentation. Appropriate training and credentialing of optometrists who wished to become involved would be required, and this would be complemented by very careful patient selection. This ideal situation would subsequently result in minimal false positive referrals to the hospital eye service.

The ideal equipment list to fully co-manage glaucoma patients would include:

1. Slit lamp with Goldman tonometer
2. Tonopen tonometer
3. Indirect lenses e.g. 90D
4. Four mirror gonioscopy lenses
5. Automated visual fields e.g. Henson / Humphrey
6. Optic disc stereo-photography e.g. Discam
7. A nerve fibre or optic disc analyser eg. HRT II would be a bonus

In an assessment of observer variability, in regard to optic disc assessment, three optometrists and two ophthalmologists assessed forty-eight stereo-pairs of optic discs. All disc assessments were comparable, but a 0.1 change in calculated cup to disc ratio was observed in 22 to 26% of cases when stereo pairs were re-evaluated. However, this study concluded that the chance of a 0.2 change in cup to disc ratio being identified, where no difference had genuinely occurred, was less than 5%. This is in keeping with general ophthalmic practice wherein a 0.1CDR "change" is considered within the limits of predictability for clinical assessment.

Shared care involves a negotiation between optometry and ophthalmology in terms of clearly structured co-management criteria and re-referral criteria (e.g. Bristol Shared Care Studies).

In addition to the need for standardised equipment such as Goldmann tonometers and Humphrey field analysers, a standard decision making and information collection process must also be established.

Martin (1999) outlined a number of the decision making steps in the co-management of chronic open angle glaucoma in a questionnaire to ophthalmic nurses who were directly involved in the management of glaucoma subjects:

Co-management review and decision-making processes

1. Record the medical history
2. Decide which examinations to perform
3. Decide whether current IOP is acceptable
4. Decide whether current visual fields indicate deterioration
5. Evaluate anterior chamber depth
6. Check for pseudoexfoliation
7. Suggest change in treatment on basis of clinical findings
8. Suggest change in treatment for medical or social reasons
9. Decide what examinations are required at next visit
10. Decide whether patient needs consultation with Ophthalmologist
11. Decide whether next visit has to be sooner than planned
12. Decide whether next visit can be postponed
13. Decide whether follow-up can terminate
14. Provide patient with appropriate prescriptions

Glaucoma co-management in practice

The Bristol shared care glaucoma study involved a randomised two-year protocol, in which 27% of the initial cohort of patients fulfilled the entry criteria and 403 patients were enrolled to be followed by either community optometrists or the hospital eye service.

Interestingly, no differences in any key visual variables were identified at two years, in respect to subjects followed by either the community optometry or hospital system. However, whilst the cost of the hospital service varied from £14.50 to £59.95 the community optometry cost was more expensive and ranged from £68.98 to £108.98. In this latter regard, in an earlier study of community monitoring, calculated from eight Optometry practices in the Bristol area between 1993 and 1994, it was noted that the average full cost of a 40 minutes examination was £31.56, and that there was an average of 16 appointments free per month. However, although a minimum fee of £26.23 was agreed for the community monitoring of a small number of glaucoma patients, this rose to £43.16 for 100 glaucoma patients per annum.

**Table 6: Bristol Shared-Care Glaucoma Study-
Return-referral criteria for community based optometrists**

Test	Glaucoma Suspect	Glaucoma Patient
IOP	≥ 30mmHg	≥ 24mmHg
Fields	Defect on Henson scale	≥ 7 new points missed – “repeat field test” if average of 2 fields ≥ 4
Optic Disc	Increased cupping ≥ 0.2 Disc haemorrhage	Increased cupping by ≥ 0.2 Disc haemorrhage

Interestingly, in relation to co-management of glaucoma within the community, patients perceived a number of significant advantages which included: ease of travel to appointments, ease of a timing of appointments, a lesser duration of wait to be seen, and aspects of the reception area, privacy, and overall attitude of the eye care professional.

There is no doubt, that for selected patients, co-management rather than simple screening of glaucoma, can be serviced by appropriately accredited community optometrists, however, whether there would indeed be a net financial saving to the National Health Service is debatable. Nonetheless, this might still provide an improved service in terms of patient’s acceptance and approval of glaucoma management.

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