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SUPPORTING VISION 2020: THE RIGHT TO SIGHT

EDITORIAL: THE ADULT GLAUCOMAS

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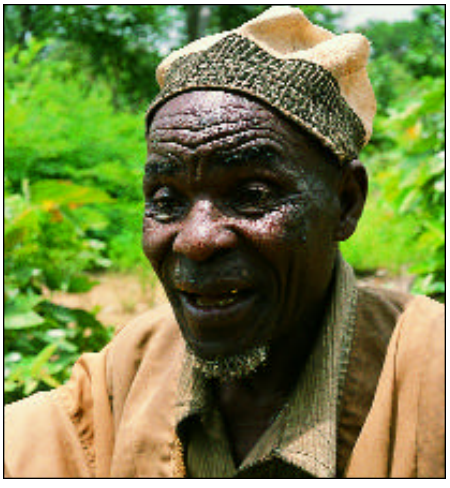

Primary angle-closure glaucoma is more common in East Asians while primary open angle glaucoma occurs more often in Africans and Europeans

Photos: Pak Sang Lee

There is little doubt that the glaucomas now constitute the second cause of global blindness, after cataract. With the ageing of most populations, new surveys suggest that even Harry Quigley's 2000 projection of 6.7 million blind due to glaucoma was an underestimate.[1] Yet glaucoma has not been included as one of the priority conditions for disease control in the first 5-year programme of the Vision 2020 initiative. Why is this?

Although it is agreed that the burden of blindnessdueto differenttypesofglaucoma is high, the problem has been that we have not had either reliable ways of detecting these diseases or straightforward ways of treating them in large populations, within prevention of blindness programmes. In the past few years, however, there have been some rapid developments which are changing our perspective.

It would seem self-evident that screening of populations for primary open angle glaucoma (POAG) – the common form in populations of African and European origin – must be a 'good thing' and should be encouraged. However, at present there is no single inexpensive, practical and valid screening test.

Maria Papadopoulos and Peng Khaw refer to a number of new devices for obtaining images of the optic nerve head or the retinal nerve fibre layer in POAG. Although they involve sophisticated technology and at present are expensive, it is quite possible that further refinements of these types of instruments may turn out to be the most cost-effective method of screening large populations for primary open angle glaucoma, and so meet the rigorous requirement for a satisfactory screening test.

In the meantime, we need simple and practical methods of detecting those people with moderately advanced chronic glaucoma who need immediate treatment. Colin Cook has outlined a practical approach to case detection in Africans, developed from his extensive experience in KwaZulu-Natal.

It must be pointed out that the criteria for the 'either-or' decision as to whether a person should be referred for further investigation, and for deciding whether treatment is needed, are not the same as the criteria for case-definition of glaucoma in an epidemiological study.

The common form of glaucoma in East Asian populations is primary angle-closure glaucoma (PACG). From his studies in Singapore, Paul Foster found that patients with PACG were more likely to be blind in at least one eye than those with POAG.[2] PACG appears to be the largest cause of irreversible blindness in Asia. The risk of an eye developing angle-closure between the trabecular meshwork and the peripheral iris

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is usually indicated, in turn, by the depth of the anterior chamber in the optic axis. These anatomical features form the basis for practical screening tests, either at the slit-lamp or by ultrasound, so that a true screening programme in those populations at high risk now seems a real possibility.

The secondary glaucomas account for up to 25–30% of all glaucoma in some surveys. Eyes with secondary glaucoma are also more likely to be blind than those suffering from POAG. Drs Krishnadas and Ramakrishnan outline the main causes of secondary glaucoma. These can be grouped under 4 main headings: neovascular, uveitic, lens-related and traumatic. The relative importance of these forms will vary from location to location. Since they are all usually associated with a high intraocular pressure and reduced vision, the cases can be detected at primary and secondary levels using the protocol outlined by Cook.

Because of the burden of blindness caused by the glaucomas and the progress that is being made in controlling some of the other major causes of blindness, it is likely that the glaucomas will be included in the next 5-year strategy for Vision 2020. During the next 3 to 4 years we, therefore, need to be refining our methods for screening (or case-detection) and for treatment so that they can be applied to very large numbers of people.

References

1 Quigley H A. Number of people with glaucoma worldwide. *Br J Ophthalmol* 1996; **80**: 389–393.
2 Foster P J, Oen F T S, Machin D, et al. The prevalence of glaucoma in Chinese residents in Singapore. A cross-sectional population survey of the Tanjong Pagar District. *Arch Ophthalmol* 2000; **118**: 1105–1111.

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What's New in Primary Open Angle Glaucoma?

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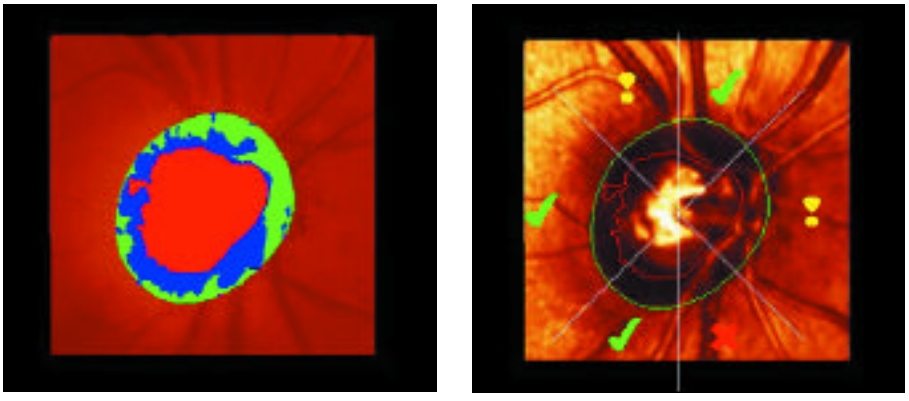

Fig. 1: Image obtained using Heidelberg Retinal Tomograph (HRT II)

Photos: T Garway-Heath

Primary open angle glaucoma (POAG) involves a spectrum of disorders typified by a characteristic optic neuropathy and field loss in eyes with open drainage angles. It is currently a leading cause of blindness worldwide, and in the future should become even more important as populations age throughout the world. Recently, we have witnessed a number of exciting advances in glaucoma. Developments have occurred regarding diagnosis, treatment, genetics and the relationship of intraocular pressure (IOP) to disease progression.

Recent New Findings

A. Diagnosis

Optic nerve and retinal nerve fibre imaging

Limitations in optic disc and retinal nerve fibre layer assessment have stimulated the development of *imaging devices* that measure either the optic disc cup and neuroretinal rim area or the retinal nerve fibre layer. The most advanced at present are ***scanning laser tomography*** (Fig.1) and ***scanning laser polarimetry*** (retinal nerve fibre analyser). They offer greater objectivity but are limited by potential sources of error and so the results must still be interpreted in association with clinical findings. This quantitative imaging may be useful in early diagnosis before obvious visual field loss occurs and may allow increased sensitivity to detect progression of the condition.

Visual field and psychophysical testing

New *fast test visual fieldstrategies,* such as ***SITA*** (Swedish Interactive Thresholding Algorithm), have become available which improvepatienttestcompliance. Computerised programmes for serial visual field analysis ***(PROGRESSOR),*** which assess progression of disease by accounting for test variability are available. Other modes of testing which involve ***motion detection*** may enable earlier diagnosis.

B. Treatment

Medical

The introduction of *sustained release*, once a day form of β blocker or pilocarpine has provedusefulintermsof better compliance and convenience. However, ***prostaglandin analogues,*** which increase uveoscleral outflow, have had the most significant impact. ***Latanoprost*** (Xalatan) appears to be the *most effective IOP-reducing agent currently available*, with a low incidence of ocular and systemic side effects. *Unoprostone* (Rescula), *Bimatoprost* (Lumigan) and *Travoprost* (Travatan) have all recently been approved for use by the Food and Drug Administration in the United States.

Topical carbonic anhydrase inhibitors, such as *Dorzolamide* (Trusopt), lower IOP but less effectively than oral acetazolamide.Another form, *Brinzolamide* (Azopt) has a more physiologic pH and so less topical side effects. The alpha agonist, *Brimonidine* (Alphagan) is claimed to be neuroprotective, but no clinical evidence exists.

Surgical

One of the most fundamental questions in glaucoma, 'How low must the IOP be to prevent further glaucoma damage?' has recently been addressed by a multicentre, prospective clinical trial.[1] Patients with advanced POAG and IOP consistently less than 18 mmHg after surgery (mean IOP 12.3 mmHg) were found to have no visual field progression after 8 years of follow up. The clinical implication is that we should aim for a *low normal target IOP range* in patients with moderate to severe glaucoma.

The use of the antimetabolites, ***5-Fluorouracil (5FU)*** and ***Mitomycin-C (MMC),*** topreventsurgicalfailurehasbeen the ***greatest advancement in glaucoma surgery*** over the last two decades. Single, *intraoperative application* has improved convenience of drug delivery. Strategies that change ***bleb morphology*** favourably are now available to avoid the development of focal, thin, avascular cystic blebs associated with antimetabolite use. These include a larger surface area of antimetabolite treatment,[2] a fornix based conjunctival flap to reduce posterior restriction and a large scleral flap with closure that diverts aqueous posteriorly (Fig. 2). These simple mod-

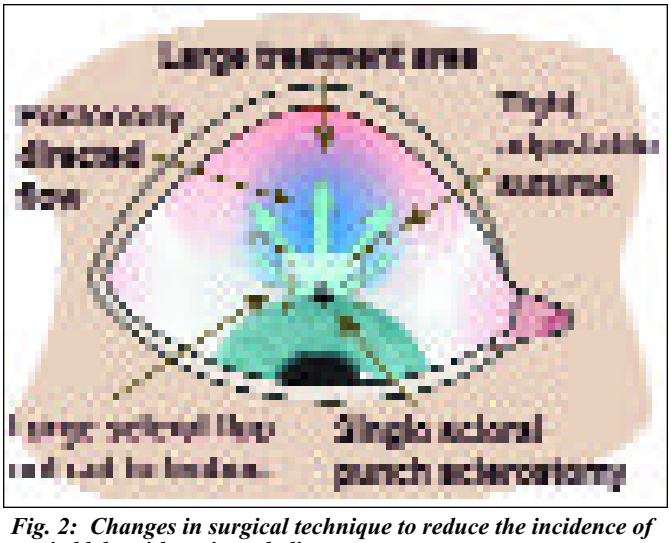

Fig. 2: Changes in surgical technique to reduce the incidence of cystic blebs with antimetabolite use

Diagram: Alan Lacey

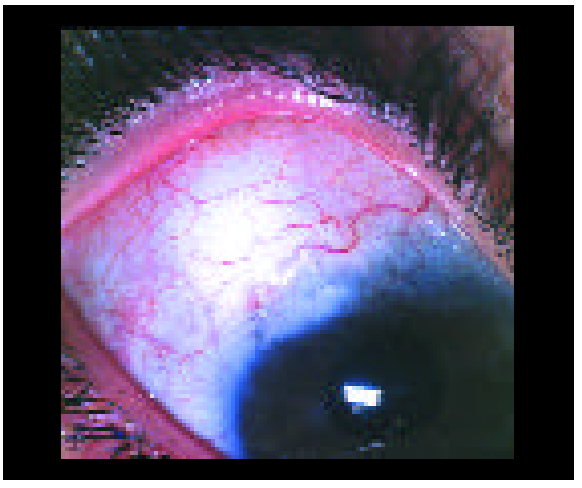

Fig. 3: Diffuse, non-cystic bleb using Mitomycin-C 0.5mg/ml. Large surface area of treatment, fornix based flap to reduce posterior restriction and large scleral flap to divert aqueous backwards

Photo: PT Khaw

ifications can achieve a much more diffuse, non-cystic bleb even with high dose antimetabolites (Fig. 3).

Recently, there has been renewed interest in ***non-penetrating trabecular surgery*** because of the desire to avoid potential complications associated with ocular entry, such as hypotony and subsequent cataract. Although prospective, comparative studies of these new methods with trabeculectomy have demonstrated *fewer complications*, it has become evident that non-penetrating surgery is *not as successful in reducing IOP*.[3] However, a higher incidence of cataract formation following trabeculectomy may in fact entirely reduce this advantage.

C. Genetics

Our understanding of the genetic basis of glaucoma has improved considerably over the past decade. It is likely that the aetiology of POAG is *multifactorial* [4] resulting from a combination of mutations in more than one gene and as yet unidentified environmental factors. With regard to juvenile and adult-onset POAG, several loci have been identified. However, only one gene is known, namely the ***myocilin / TIGR (trabecular meshwork inducible glucocorticoid response) gene*** at the GLC1A locus on chromosome 1q21-q31. More than thirty mutations of this gene have been identified in ethnically diverse populations worldwide. Studies have shown that it is responsible for only about 5% of POAG overall.

Research Issues

Although impressive advancements have occurred in glaucoma, the future appears to be even more exciting.

A. Diagnosis

Another scanning device currently being developed is 3rd generation ***optical coherence tomography*** with ultrahigh resolution (2–3 μm). It allows *in vivo* visualisation of retinal structures and may prove useful for early diagnosis. Similarly, ***multifocal visual evoked potentials*** (mVEP) objectively may identify visual field defects earlier than white on white perimetry.

B. Treatment

Medical

As the role of IOP-independent mechanisms becomes increasingly recognised, innovative treatments include agents that *improve ocular blood flow* or are *neuroprotective.* Furthermore, the possibility of a *'medical trabeculectomy'* based on biochemical and genetic manipulation of the trabecular meshwork to restore function is very exciting as is work on *trabecular meshwork cell transplantation.*

Surgical

The ***healing process*** is the main determinant of IOP following glaucoma filtration surgery. The ongoing search for safer, less toxic and more effective antiscarring agents has led to a number of exciting developments. ***Transforming growth factor β (TGF β),*** a potent stimulator of healing, can be successfully neutralised *in vivo* and *in vitro* with ***humanised antibodies*** and studies are currently underway to assess clinical efficacy. Ultimately, other specific agents may allow us to set the IOP safely after surgery in the 10–14 mmHg range.

C. Genetics

The transmission of disease in GLC1A families is autosomal dominant with variable penetrance. Presymptomatic diagnosis of at risk individuals in pedigrees with GLC1A mutations is already possible. But, as the mutation is responsible for a small fraction of POAG, the most useful role of screening will be in large families with early onset, severe disease where early diagnosis and intervention may improve prognosis and also allow for genetic counselling. Hopefully, a greater understanding of basic genetic biology will identify patients at risk and ultimately lead to new treatments that prevent or cure the disease.

Vision 2020

The main problem continues to be *identifying patients* who are in need of intervention, particularly individuals in developing countries who account for 85% of patients affected with glaucoma. In the industrialised world, only 50% of people with established POAG are diagnosed, usually through the course of routine eye examination. But in the developing world, patients frequently present with severe visual loss beforetheyareidentified.However,screening a population for a rare disease such as glaucoma is difficult, especially when the infrastructure to deal with positive cases is lacking. To achieve the ***Vision 2020 goals*** to reduce blindness from glaucoma in developing countries, we need strategies that identify individuals with obvious glaucoma, using simple tests. Detection rates can be increased by improving the training of staff in optic disc, IOP and visual field examination and also by increased public awareness of the potential benefits of regular eye examination.

Currently, glaucoma filtering surgery with adjunctive anti-scarring therapy offers the best single intervention strategy to slow the rate of disease progression by sufficiently lowering IOP to prevent blindness. The challenge will be to deliver this in a form that is relatively simple, safe, fast and inexpensive with an acceptable long-term success rate. Given what we now know, this may soon be possible.

References

1 The advanced glaucoma intervention study (AGIS) 7. The relationship between the control of intraocular pressure and visual field deterioration. *Am J Ophthalmol* 2000; **130**: 429–440.

2 Cordeiro MF, Constable PH, Alexander RA, Bhattacharya SS, Khaw PT. Effect of varying the mitomycin-C treatment area in glaucoma filtering surgery in the rabbit. *Invest Ophthalmol Vis Sci* 1997; **38**: 1639–1646.

3 Chiselita D. Non-penetrating deep sclerectomy versus trabeculectomy in primary open angle glaucoma surgery. *Eye* 2001; **15**:197–201.

4 Budde WM. Heredity in primary open angle glaucoma. *Curr Opin Ophthalmol* 2000; **11**: 101–106.

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Advances in the Understanding of Primary Angle-Closure as a Cause of Glaucomatous Optic Neuropathy

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In the last few years the classification of angle-closure glaucoma has undergone revision. This is a result of population research in regions where angle-closure glaucoma is a major cause of blindness. Several studies have shown that most cases of angle-closure that cause glaucomatous optic neuropathy occur without the symptoms that Western ophthalmologists associate with episodes of acute angle-closure.[1–3] We have, therefore, started using the classification scheme detailed in Table 1 in our research.

Other ocular tissues may be damaged by angle-closure. These are illustrated in Fig. 1. Damage to different structures should be specifically described when recording case details.

Prevalence of Angle-Closure

Ethnicity

Ethnic background is one of the major factors determining susceptibility to primary angle-closure (PAC). Population surveys show PAC is more common among people of Asian descent than those from Europe. Among people aged 40 years and over, the prevalence of PAC (the number of cases present at one point in time) ranges from 0.1% in Europeans,[4] through 1.4% in East Asians [2,5] and up to 5% in Greenland Inuit.[6] In Africa, a clinic-based study found the rate of primary angle-closure (gonioscopically verified closure of the angle with raised IOP) was equal among the black and white populations of Johannesburg. Among the white population 66% of cases were symptomatic, whereas only 31.5% of the black patients reported symptoms.[7]

Age and gender

The manifestations of ocular damage resulting from primary closure of the drainage angle are rare before the age of 40 years. After this, the prevalence of disease increases with age.[1,2] Female gender is recognised as a major predisposing factor toward development of PAC. The prevalence of occludable drainage angles, PAC and PACG (Table 1), all tend to be higher in women than men. [1,2]

Incidence of Angle-Closure

While prevalence is the standard measure of population morbidity at a specific time, events that are of short duration are more effectively quantified by calculating incidence (the number of new cases occurring over a specified period). The acute, symptomatic form of PAC is one such event. Incidence figures (given as cases/100,000 persons/year for the population aged 30 years and over) range from 4.7 in Finland to 15.5 in Singapore. As with prevalence, incidence increases with advancing age and shows that an excess of females are afflicted.[8]

Ocular Characteristics Associated with Angle-Closure

A shallow anterior chamber has long been recognised as a factor that predisposes toward angle-closure. The depth of the anterior chamber reduces with age and tends to be shallower in women than men.[9]

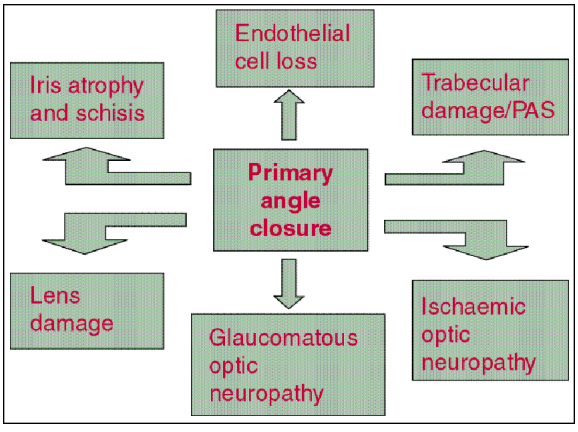


Fig.1: Damage to ocular tissues in angle-closure glaucoma

Ethnic groups that have a high prevalence of PAC have shallower anterior chambers.[9]

The depth of the anterior chamber is determined by the position of the lens within the globe, which in turn determines the width of the drainage angle. Although the relationship is not a simple geometric one, we examined anterior chamber depth (using an optical pachymeter) and gonioscopic configuration (assessed in four quadrants, using Shaffer's grading scheme) in 942 Mongolians, aged 40–87. We found that 74% of variation in the width of the drainage angle could be explained solely on the basis of variation in anterior chamber depth (Foster PJ, Baasanhu J, Johnson G J: 1995 Unpublished).

Refractive status, anterior chamber depth, lens thickness and axial length are usually associated. Anterior chambers are

Table 1: Classification of Primary Angle-Closure

1. Primary angle-closure suspect
An eye in which appositional contact between the peripheral iris and posterior trabecular meshwork is considered possible.

2. Primary angle-closure (PAC)

(a) Non-ischaemic: an eye with an occludable drainage angle and features suggesting trabecular dysfunction, such as peripheral anterior synechiae, elevated intraocular pressure or excessive pigment deposition on the trabecular surface. The optic disc and visual field are normal.

(b) Ischaemic: the presence of iris whorling, stromal atrophy or glaukomflecken signify previous 'acute' PAC. However, as these are areas of ischaemic necrosis, we suggest that 'ischaemic PAC' is the correct description. Differentiating between non-ischaemic and ischaemic PAC is supported by experimental evidence that the iris and ciliary body are the ocular tissues most sensitive to pressure-induced ischaemia. Damage to the optic nerve only occurs at higher pressures, and therefore anterior segment ischaemic sequelae indicate that nerve ischaemia may have occurred, but do not confirm it.

3. Primary angle-closure glaucoma (PACG)
Glaucomatous optic atrophy, with a characteristic visual field defect in the presence of an occludable drainage angle or signs of PAC.

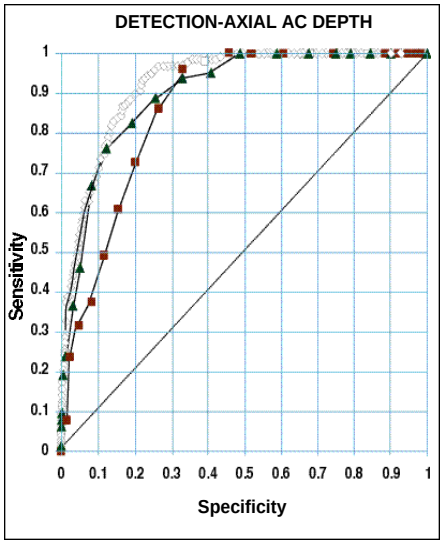


Fig. 2: Detection of narrow drainage angles by measurement of axial AC depth using optical pachymetry (diamonds ◇), slit-lamp mounted ultrasound (triangles ▲) and hand-held ultrasound (squares ■)

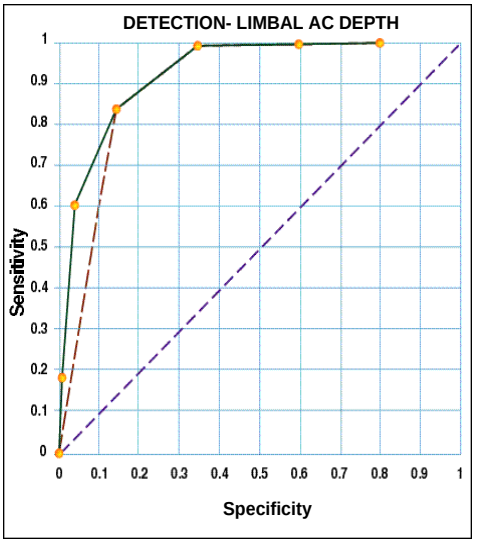


Fig. 3: Detection of narrow drainage angles using the Van Herick technique (limbal chamber depth estimation) using traditional grading (dashed line) and a modified grading scheme (solid line)

shallower in hypermetropes than in myopes. Angle-closure is typically associated with a hypermetropic refractive state. Increasing living standards and higher educational attainment in Asian and Inuit populations seem to have been paralleled by an increasing prevalence of myopia.[10,11] In Singapore, half the male Chinese population aged 15 to 25 years is myopic. Among those with a university education, this figure rises to 66%.[10] This raises the question of whether the high rate of PAC previously encountered in these populations is destined to decline.

Screening for Primary Angle-Closure Glaucoma: An International Perspective

Glaucoma is now probably the leading cause of irreversible blindness world-wide. It is suggested that 73 million people suffer from glaucoma, and, in 1996, Quigley estimated that 6.7 million were blind.[12] The population of Asia account for the majority of this number and in a recent study of the prevalence of glaucoma in Singapore, we found that only 24% of POAG sufferers were blind in at least one eye, but 57% of PACGsuffererswereblind in one eye. This difference was highly significant.[3]

The epidemiology and natural history of POAG are relatively well understood.Until recently the epidemiology of PACG was not as clearly understood, but over the last 5 years there has been an increased researcheffort,andthisdeficiency is gradually being re-dressed. Previously, IOP was held to be the most suitable risk-factor for POAG that could be used for screening. However, although raised IOP is sufficient to cause glaucoma, it is not necessary. Between one-half and two-thirds of POAG cases have an IOP consistently within the 'statisticallynormal'range.Psychophysical tests and disc imaging techniques offer promise although the technology is immature and remains to be proven.

Anterior chamber depth

In contrast, PACG does have features that are more readily identifiable. Closure of the drainage angle requires the iris and the trabecular meshwork to be in relatively close proximity prior to the development of the closure process. The association between PACG and a shallow anterior chamber has prompted the investigation of measurement of central and limbal anterior chamber depth measurement as tools for screening for PACG.

In the context of a screening programme for PACG, the intention would be to detect persons with appositional angle-closure, in the 'latent' phase of the disease before glaucomatous optic neuropathy has developed. These people can be reliably detected by either measurement of the axial ACD (either by optical pachymetry or A-mode ultrasound), or grading of the limbal chamber depth by the van Herick technique where the slit-lamp beam is shone at right angles to the cornea at its periphery, close to the limbus. Both these tests will give a sensitivity and specificity of over 80%. Assuming a population prevalence of 5% for people aged 40 years and over with occludable drainage angles, this translates to positive and negative predictive values of the tests of 17% and 99%. These figures mean that 17% of people 'failing' the screening test and being referred for confirmatory examination will have occludable drainage angles. Put another way, about 1 out of 5 people referred to an ophthalmologist for gonioscopic examination would require treatment. One person in 100 would be incorrectly classified as normal.[13,14]

The suitability of the tests for mass screening varies. Both axial and limbal chamber depth grading have been used in thefieldonover1,700peopleplein Mongolia, and were found to be acceptable and safe. The limbal chamber depth (van Herick) grading requires a slit-lamp, and probably an ophthalmologist or experienced technician. It is, therefore, limited by the need for sophisticated equipment and highly trained staff. Axial chamber depth measurement by optical pachymetry has the same limitations. Ultrasound measurement of anterior chamber depth with a hand-held probe avoids the need for a slit-lamp, but gives much less reproducible measurements than slit-lamp-mounted ultrasound.[15] Using a hand-held device in a population-based screening programme would result in a small but significant degradation in test performance.[13] Therefore, the ideal method would use a joy-stick directed ultrasound probe mounted on a stabilised base-plate with a chin-rest. It is envisaged that a self-contained screening kit would fit into a small suitcase. A prototype of this device is currently in production.

Management

The next consideration, after detection, is the management of persons found to have occludable drainage angles. Prophylactic laser peripheral iridotomy (PI) offers a non-invasive, quick procedure that has few significant short-term complications. Probably the most significant complication from the point of view of care of a patient with glaucoma is the post-laser pressure spike, although adequate pre-medication should prevent this. However, pre-medication, either with topical apraclonidine or oral acetazolamide, may have serious side-effects. Use of apraclonidine has been associated with collapse in one elderly female patient undergoing laser treatment. The risk of erythema multiforme with acetazolamide is small but present. In a regional or national blindness prevention campaign where the number of people treated might run into thousands, these rare but severe adverse effects may become significant factors in the risk benefit equation.

More importantly, the efficacy of laser

PI as a prophylactic measure for PACG is uncertain. It has been suggested that PACG in Asian people may often be caused by a non-pupil block mechanism, which would not be amenable to laser iridotomy. However, a follow-up study performed in 1998 looking at Mongolian people with occludable drainage angles treated in our 1995 and 1997 surveys found that the median angle width had increased by 2 Shaffer grades following laser PI. Patent peripheral iridotomies were found in 98%. Iridotomy alone failed in 3% of eyes with narrow drainage angles and either peripheral anterior synechiae or raised IOP, but normal optic discs and visual fields. However, in eyes with established glaucomatous optic neuropathyatdiagnosis,iridotomyfailedin 47%. None of the eyes with narrow angles that were normal in all other respects and underwent iridotomy, developed glaucomatous optic neuropathy or symptomatic angle-closure within the short follow-up period. This suggests that Nd:YAG laser iridotomy is effective in widening the drainage angle, and reducing elevated IOP in East Asian people with primary angle-closure without glaucomatous optic neuropathy.

Furthermore, it suggests that pupil-block is a significant mechanism causing closure of the angle in this population. Once glaucomatous optic neuropathy associated with synechial angle-closure has occurred, iridotomy alone is less effective at controlling IOP [16] and trabeculectomy will usually be necessary.

Conclusion

The understanding of the epidemiology and management of primary angle-closure has advanced considerably in the last decade. PACG is possibly the leading cause of blindness in East Asian countries. There is great interest in the natural history of narrow drainage angles and eyes with PAC. Only longitudinal data will help us determine who should receive treatment. Further information is also needed on the effect of laser iridotomy on eyes in the very earliest stages of angle-closure. Most of these low risk eyes will never suffer significant loss of vision from PACG. It is important to be sure that laser PI does not cause significant side effects (such as cataract) in a small number of people, that may outweigh its benefits in preventing a few cases of PACG. However, there is now considerable optimism that screening and prophylactic treatment for PAC and PACG may be a viable method of preventing blindness in very large numbers of people in Asia.

References

1 Salmon JF, Mermoud A, Ivey A, Swanevelder SA, Hoffman M. The prevalence of primary angle-closure glaucoma and open angle glaucoma in Mamre, Western Cape, South Africa. *Arch Ophthalmol* 1993; **111**: 1263–1269.

2 Foster PJ, Baasanhu J, Alsbirk PH, Munkhbayar D, Uranchimeg D, Johnson GJ. Glaucoma in Mongolia – A population-based survey in Hövsgöl Province, Northern Mongolia. *Arch Ophthalmol* 1996; **114**: 1235–1241.

3 Foster PJ, Oen FT, Machin DS, et al. The prevalence of glaucoma in Chinese residents of Singapore. A cross-sectional population survey in Tanjong Pagar district. *Arch Ophthalmol* 2000; **118**: 1105–1111.

4 Hollows FC, Graham PA. Intraocular pressure, glaucoma and glaucoma suspects in a defined population. *Br J Ophthalmol* 1966; **50**: 570–586.

5 Hu Z, Zhao ZL, Dong FT. [An epidemiological investigation of glaucoma in Beijing and Shunyi county]. [Chinese]. *Chung-Hua Yen Ko Tsa Chih [Chinese Journal of Ophthalmology]*. 1989; **25**: 115–118.

6 Clemmesen V, Alsbirk PH. Primary angle-closure glaucoma (a.c.g.) in Greenland. *Acta Ophthalmol* 1971; **49**: 47–58.

7 Luntz MH. Primary angle-closure glaucoma in urbanized South African caucasoid and negroid communities. *Br J Ophthalmol* 1973; **57**: 445–456.

8 Seah SKL, Foster PJ, Chew PT, et al. Incidence of Acute Primary Angle-closure Glaucoma in Singapore. An Island-Wide Survey. *Arch Ophthalmol* 1997; **115**: 1436–1440.

9 Foster PJ, Alsbirk PH, Baasanhu J, Munkhbayar D, Uranchimeg D, Johnson GJ. Anterior chamber depth in Mongolians. Variation with age, sex and method of measurement. *Am J Ophthalmol* 1997; **124**: 53–60.

10 Au Eong KG, Tay TH, Lim MK. Race, culture and myopia in 110,236 young Singaporean males. *Singapore Med J* 1993; **34**: 29–32.

11 Johnson GJ. Myopia in arctic regions. A survey. *Acta Ophthalmol (Suppl.)*. 1988;Suppl. **185**: 13–18.

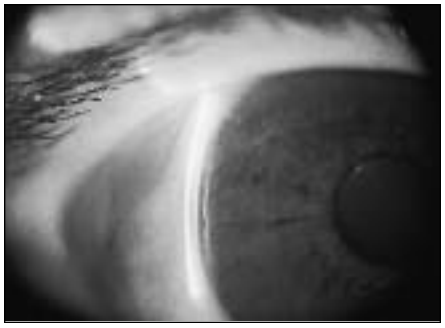
12 Quigley HA. Number of people with glaucoma worldwide. *Br J Ophthalmol* 1996; **80**: 389–393.

13 Devereux JG, Foster PJ, Baasanhu J, et al. Anterior chamber depth measurement as a screening tool for primary angle-closure glaucoma in an East Asian population. *Arch Ophthalmol* 2000; **118**: 257–263.

14 Foster PJ, Devereux JG, Alsbirk PH, et al. Detection of gonioscopically occludable angles and primary angle closure glaucoma by estimation of limbal chamber depth in Asians: modified grading scheme. *Br J Ophthalmol* 2000; **84**: 186–192.

15 Seah SKL, Foster PJ. Anterior Chamber Depth Measurement Variation. *Invest Ophthamol Vis Sci (ARVO Suppl)*. 1997; **38**: S164(Abstract).

16 Nolan W P, Foster P J, Devereux J G, et al. YAG laser iridotomy treatment for primary angle closure in east African eyes. *Brit J Ophthalmol* 2000; **11**: 1255–1259.



Grading the limbal chamber depth by the van Herick technique

Photo: Paul Foster

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WRITE TO US AND SHARE YOUR EXPERIENCE!

The next issue of the Journal will be on the theme of **Improving Patient Care**. We inviteyoutosendus a **shortreport** ofyourownexperienceinimproving thequality of patient care, written with the patients'own views and perspectives in mind.

Guidelines

We are seeking to report ways of improving the support and care of patients, other than direct medical/surgical treatment itself – care that makes a difference, for example, to the patient's recovery, to their levels of satisfaction with the service provided and/or their willingness to attend for follow-up or to recommend the service to others.

Choosing **one example** where change was made and accepted, describe this initiative under the following suggested headings:

1. Title
2. Method(s)
3. Findings
4. Action(s) taken
5. Consequences of action(s)

Reports should be confined to 300–400 words and must reach us by **31 January 2002**. One good photograph may be sent, if available.

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Secondary Glaucomas: The Tasks Ahead

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Introduction

While the prevalences of morbidity and visual impairment due to primary open angle and angle-closure glaucomas have been fairly well established by population surveys in the west and, recently, in the developing world, the issue of blindness from secondary glaucomas has received little attention from most investigators. Individuals with secondary glaucoma tend to report promptly to the ophthalmologist since there is often marked reduction in visual acuity, apart from pain and ocular discomfort. As a consequence, these are largely self-reported.

Information on secondary glaucomas in published eye surveys is limited and the cause of glaucoma seldom identified, although in several prevalence studies secondary glaucomas are numerically important (Table 1). Based on the WHO Blindness Data Bank, Thylefors and Negrel, in their world estimate of glaucoma blindness, found it was not possible to determine the number of blind from secondary glaucoma, although they estimated the world prevalence to be 2.7 million.[1] Quigley emphasised that few studies describe secondary glaucomas as a separate entity and most investigators do not provide the criteria used in defining this potentially blinding disorder. The mean prevalence of this condition is 0.44 [SD 0.36%] or 18% of the mean prevalence of primary open angle glaucoma in the world.[2] Quigley estimated that 6 million people in the world have secondary glaucoma compared with 67 million with the primary glaucomas.

The Glaucoma Services at the Aravind Eye Hospital, a large tertiary eye care centre in South India, registered 367 individuals with various secondary glaucomas (Table 2) in the year 2000. This represents about 6.0 % of total new cases of glaucoma seen annually.

Lens Induced Secondary Glaucomas

Lens induced glaucomas due to hypermature cataracts are an important cause of secondary glaucoma in the developing world. Cataract accounts for 50–80% of the world's blind and in the developing world financial, cultural and psychosocial barriers to accessing excellent surgical services still exist. There is an ever increasing backlog of cataract due to the population explosion, increased life expectancy and low productivity in terms of utilisation of the available surgical services. The uptake of eye care services by the rural community has also been suboptimal in countries like India[3] where lens induced glaucomas are a common cause of ocular morbidity. It should be recognised that reduced vision is not the only indication for cataract surgery. An enlarged, cataractous lens can cause phacomorphic glaucoma (see below), the treatment of which is removal of the lens.

Under Vision 2020, the global initiative of the WHO and voluntary service organisations, to reduce significantly 'avoidable' blindness by the year 2020, it is intended that cataract surgeries performed will increase, particularly in the developing nations.Currently,itisestimatedthatabout 12 million cataract operations are performed each year the world over. Vision 2020 aims to achieve a target of about 20 million cataract operations by the year 2010 and ultimately reach a target of 32 million people receiving cataract surgery annually by 2020.

Although recent advances in sutureless small incision cataract surgery and phacoemulsification and improved IOL designs have resulted in vastly superior outcomes with reduced complications related to wound repair and secondary glaucomas, several problems still remain. These require training of ophthalmologists in the emerging, new techniques and tackling complications peculiar to the new surgical methods, which may include glaucoma and inflammation secondary to retained lens fragments. These measures will also reduce complications such as pseudophakic glaucoma, for example, yet another significant cause of secondary glaucoma.

Phacomorphic glaucoma

The cataractous lens may become swollen (intumescent) which causes relative pupil block, the iris root is moved forward and this may result in blockage of outflow of aqueous fluid at the angle of the anterior chamber. This is a secondary form of angle-closure glaucoma.

Phacolytic glaucoma

Lens material may cause blockage of outflow of the aqueous at the drainage angle and this may occur after injury (including cataract surgery) or when lens material leaks through the lens capsule of a mature/hypermature lens. Macrophages, attempting to remove this abnormal mater-

Table 1: Prevalence of Secondary Glaucomas as Reported by Population Based Surveys

(Adapted from Johnson GJ. The Glaucomas. In: Johnson GJ, Minassian DC, Weale R. The Epidemiology of Eye Disease. Chapman & Hall, 1999)

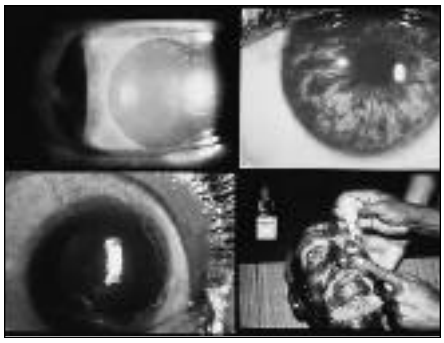
Prevalence Study	Age Groups Evaluated (in years)	Prevalence Rate (in population sampled)
Ferndale, Wales	40-74	0.26
Dalby, Sweden	55-69	0.27
Baltimore, Maryland		
Caucasians	>40	0.68
African Americans	>40	1.42
Rotterdam, Netherlands	>55	Nil
Blue Mountains, Australia	>49	0.15
Barbados	40-84	0.7
Umanaq, Greenland	>40	1.00
NW Alaska	>40	Nil
Japan	>40	0.48
Hövsgöl, Mongolia	>40	0.30
Mamre, South Africa	>40	0.81
Madurai, India*	>40	0.40

***The Aravind Comprehensive Eye Survey, unpublished data**

Table 2: Common Causes of Secondary Glaucomas seen in a Tertiary Eye Care Hospital in South India.*

Diagnosis	Number of Individuals with Secondary Glaucoma	Percentage of Total Glaucoma
Lens induced glaucomas	158	2.50
Neovascular glaucomas	58	0.95
Pseudophakic glaucomas	38	0.62
Uveitic glaucomas	25	0.40
Traumatic glaucomas	16	0.26
Steroid-induced glaucomas	12	0.20
Secondary glaucomas of unspecified cause	60	1.0

*Retrieved from the statistics of the Glaucoma Services of the Aravind Eye Hospital, Madurai, India in the year 2000



Secondary glaucomas. Pseudoexfoliative material on the anterior lens face (top left). Pigment dispersion syndrome (top right). Post-traumatic angle recession (bottom left). Steroid-induced glaucoma can occur with topical corticosteroids (bottom right)

Photos: Paul Foster, Gordon Johnson, John DC Anderson, Murray McGavin

ial, together with the abnormal lens material itself may cause blockage at the angle of the anterior chamber. This is described as phacolytic glaucoma.

'Lens-induced' glaucoma, in the broadest sense of the word, can be prevented by excellent cataract surgery, by operating on unilateral dense cataracts, and on second eyes if it is considered likely that the patient will not return for follow-up.

Neovascular Secondary Glaucomas

Diabetic retinopathy and central retinal vein occlusion account for nearly two-thirds of patients with neovascular glaucoma.[4]

Secondary glaucomas associated with proliferative diabetic retinopathy and central retinal vein occlusion

Neovascular glaucoma may occur in diabetics where abnormal new blood vessel formation has occurred causing disturbance to the outflow of aqueous at the angle of the anterior chamber.

Ocular neovascularisation and glaucoma may develop in 33–64% of eyes with untreated, proliferative diabetic retinopathy.[5] Diabetic retinopathy is a leading cause of blindness in persons aged 20–74 years. With improved treatment available for diabetes, life expectancy has been greatly increased, resulting in many more individuals with diabetic retinopathy. Effective metabolic control of diabetes in the population, efficient screening for early detection and treatment of diabetic retinopathy and retinal photocoagulation of eyes with proliferative diabetic retinopathy are vital in prevention and management of neovascular glaucoma. Glaucomas which remain uncontrolled with lasers and conservative therapy may be treated with cyclophotocoagulation with the newer Nd: YAG or semiconductor diode lasers with the option of glaucoma filtering surgery and adjunctive antifibrosis agents.

Neovascular glaucoma (rubeotic glaucoma) results from angle-closure secondary to a fibrovascular membrane in the anterior chamber due to ocular diseases characterised by retinal ischaemia and angiogenesis. Thrombosis of the central retinal vein will result in disturbance of the circulation within the eye and this may result in new vessel formation within the anterior segment. These abnormal blood vessels may affect the angle of the anterior chamber, where the blood vessels can be visualised, and secondary glaucoma can result.

Ischaemic central retinal vein occlusion (thrombotic glaucoma) is the second most common cause of ocular neovascularisation and glaucoma is seen in 58–86% of these eyes.[6] Essential hypertension and primary open angle glaucoma remain the principle aetiological factors in the pathogenesis of central retinal vein occlusion.

Management of the neovascular glaucomas

Ideally, eyes with conditions where neovascular glaucoma is likely should be identified early, and prophylactic panretinal laser photocoagulation given. Fundus fluorescein angiography (FFA) can be used to detect retinal capillary closure in eyes with central vein occlusion, and this should be done 6–8 weeks after the onset, once the retinal haemorrhages have cleared. All diabetics with retinal neovascularisation should have panretinal photocoagulation. If facilities are not available for FFA, clinical signs of ischaemia should be used to detect eyes at high risk (i.e., extensive cotton wool spots).

Treatment by panretinal photocoagulation of established 'rubeotic' glaucoma is often not successful, as permanent changes occur in the drainage angle.

Future research is directed at evolution of the inhibitors of angiogenesis to combat neovascular glaucoma. Antibodies to vascular endothelial growth factor(VEGF), the principle peptide involved in angiogenesis, have been succesful in reversing new vessels in primate eyes.[7] Suppressor gene therapy to prevent predisposition of individuals to neovascular glaucoma is also a distinct possibility in the future.

Eye Injuries and Secondary Glaucomas

Ocular injuries have been recognised as a common cause of monocular blindness[8] in several studies and secondary glaucoma is one of the principle causes of visual impairment. Although there is no large population based series study on the prevalence of the traumatic glaucomas, the Aravind Comprehensive Eye Survey has found a prevalence of 0.2% of glaucoma in individuals with trauma (unpublished data). Most ocular trauma and ocular morbidity has been reported in males in the younger age group, accounting for severe economic burdens in terms of days lost in work and expenditure on treatment. Early recognition of trauma and elucidation of the mechanism of glaucoma is vital to prevent visual loss.

Haemorrhage into the anterior chamber (hyphaema) and angle recession

Degenerate red blood cells may block the trabecular meshwork at the angle of the anterior chamber and there may be a secondary rise of intraocular pressure. A total oralmosttotalhyphaemamaybeassociated with a rise in pressure and, also, blood elements may penetrate the cornea resulting in corneal blood staining – which is very slow to clear. This type of hyphaema should be surgically released by paracentesis.

Further, if the haemorrhage has been the result of a severe blunt injury, for example, with damage to the trabecular meshwork and the angle of the anterior chamber, later healing with fibrosis may cause a severe

type of secondary raised intraocular pressure (post-traumatic angle recession).

Drug-induced Secondary Glaucoma

Corticosteroid-induced glaucoma

Longer term use of topical and systemic corticosteroids can result in a rise of intraocular pressure, which is usually reversible once the medication is discontinued. Glaucoma due to the indiscriminate use of topical corticosteroids for allergy and spring catarrh has left children blind from glaucomatous optic atrophy. Ophthalmologists have a pivotal role to play in preventing such needless blindness by enabling appropriate education of health workers and the general public, together with control of the availability of corticosteroids.

Uveitis and Secondary Glaucomas

In uveitis, cells and proteins in the anterior chamber disturb the normal outflow of aqueous fluid through the trabecular meshwork, causing raised intraocular pressure. Using a focal light and magnification a 'flare' may be seen in the anterior chamber—like a shaft of sunlight streaming into a room full of dust. As a result of the inflammatory reaction within the eye there may be adhesions between the pupil margin and the anterior lens surface (posterior synechiae) and/or in the angle of the anterior chamber (peripheral anterior synechiae). The pupil will dilate irregularly if posterior synechiae are present. Occasionally the adhesions may be total, affecting the entire pupil margin, and this is described as seclusio pupillae. The iris bows forward as aqueous fluid cannot pass through the pupil and this further embarrasses the drainage angle of the anterior chamber—described as 'iris bombé'.

Glaucoma secondary to uveitis is an important clinical entity, often with severe visual impairment. The management is complex since complicated cataract, macular oedema and media haze largely contribute to ocular morbidity apart from glaucomatous optic nerve damage. It has been reported that between 5.2 and 19% of eyes with uveitis develop secondary glaucoma.[9] Though most uveitic entities are idiopathic, known causes include infections like leptospirosis, toxoplasmosis, AIDS, onchocerciasis and drug-resistant tuberculosis. Adequately combating these microbial infections can significantly reduce ocular morbidityduetouveitis–apartfromaddressing the cause of elevated ocular pressures and the institution of appropriate therapy.

Pigment Dispersion Syndrome/ Pigmentary Glaucoma

In certain eyes, pigment particles may circulate abnormally in the aqueous fluid, and these in turn may cause blockage at the drainage angle. There is some debate as to whether this form of glaucoma should be described as primary or secondary glaucoma.

Exfoliation Syndrome/ Pseudoexfoliative Glaucoma

Abnormal accumulation of particles (not unlike dandruff in appearance) may accumulate in the anterior eye. This abnormal material can cause blockage of the drainage angle. Pseudoexfoliative glaucoma is particularly found in Sudan, Somalia, Ethiopia and Tanzania. It is less common in West Africa. Some consider this to be a form of primary glaucoma.

Epidemic Dropsy

This acute toxic disease is caused by the unintentional ingestion of *Argemone mexicana* oil, an adulterant of cooking oils. It has been reported in India, Mauritius, Fiji, Bangladesh and southern Africa. Rash, oedema of the lower limbs, gastrointestinal and cardiovascular disturbances may be accompanied by a secondary form of glaucoma and retinal vascular abnormalities.

Prevention of Secondary Glaucomas

- Accessible, affordable cataract services of high quality to prevent lens induced glaucoma
- Good management of hypertension to reduce retinal vein occlusions
- Good control of diabetes to prevent neovascular glaucoma
- Early detection and good management of conditions associated with the potential for retinal ischaemia and neovascularisation
- Increased awareness among eye care professionals, the public and pharmacists of the dangers of topical (and systemic) steroids
- Health education about avoiding eye injuries.

Treatment

The management of eyes with secondary glaucoma depends on whether there is the potential for useful vision:

If there is, then treatment should be aimed at lowering the IOP, reducing any associated inflammation, and treatment of the underlying cause(s) (i.e., removal of a hyphaema; removing a hypermature lens), plus other interventions to restore sight. Long term treatment to control the IOP may be required, or glaucoma surgery once the eye has become quiet and stable

If there is not the potential for useful vision (i.e., secondary glaucoma due to CRVO or end stage diabetic retinopathy), the aim of management is to give symptomatic pain relief (e.g., mydriatics and steroids, injection of retrobulbar alcohol).

Comment

Though secondary glaucomas numerically represent a smaller percentage than the primary forms of the disease, they nevertheless cause significant ocular morbidity and visual impairment. Early identification of the primary ocular and systemic diseases that predispose to the secondary glaucomas would play a significant role in limiting the burden of needless blindness.

References

1 Thylefors B, et al. Global data on blindness: an update. WHO/PBC/94.40, World Health Organization, 1994, Geneva.
2 Quigley H A. The number of people with glaucoma worldwide. *Br J Ophthalmol* 1996; **80:** 389–393.
3 Fletcher A, Thulasiraj RD, et al. Low uptake of eye services in rural India: A challenge for programs of blindness prevention. *Arch Ophthalmol* 1999; **117:**1393–1399.
4 Grant W M. Management of neovascular glaucoma. In: Leopold IH,ed. *Symposium on ocular therapy*, vol 7, St.Louis, The CV Mosby Co,1974.
5 Madsen P H: Rubeosis of the iris and haemorrhagic glaucoma in patients with proliferative diabetic retinopathy. *Br J Ophthalmol* 1971;**55**: 368–371.
6 Sinclair S M, Gragoudas E S. Prognosis for rubeosis iridis following central retinal vein occlusion. *Br J Ophthalmol* 1979; **63:** 735–742.
7 Adamis A P, et al. Inhibition of vascular endothelial growth factor prevents retinal ischaemia- associated iris neovascularisation in a non human primate. *Arch Ophthalmol* 1996; **114:** 66–71.
8 Katz J, Tielsch JM. Lifetime prevalence of ocular injuries from the Baltimore Eye Survey. *Arch Ophthalmol* 1993; **111:** 1564–1568.
9 Panek WC, Holland GN, Lee DA, Christensen RE. Glaucoma in patients with uveitis. *Br J Ophthalmol* 1990; **74**: 223–227.

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TEACHING EYE HEALTH

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The seventh article in the Teaching Eye Health series on

Evaluation of Courses

will be in the next issue of the Journal Volume 14, Issue No. 40
Editor

Chronic Glaucoma Case Finding and Treatment in Rural Africa: Some Questions and Answers

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Primary health care workers (clinic nurses, community health workers, traditional healers, and others) who work in the community and at primary care clinics should be involved in case finding of patients who have glaucoma.

Case Finding at the Primary Level: Can it Be Done?

As a part of their training in primary eye care, primary health care workers could be trained to case find glaucoma by:

1. Testing the visual acuity ('normal' or 'reduced').
2. Examining the colour of the pupil ('black' or 'white').

- Reduced visual acuity in one or both eyes + black pupil = 'blackblindness'/ visual loss ('glaucoma') →refer to secondary level

Many of these patients with 'black blindness' will not have visual loss due to glaucoma but may have a refractive error or other pathology that should still be dealt with at the secondary level.

All persons 40 years and over who are seen by primary health care workers for whatever reason could be screened in this way at least once every 2 years.

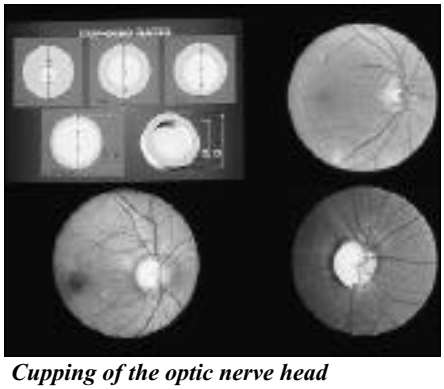
Case Finding at the Secondary Level: Should it Be Done?

Ophthalmic nurses and ophthalmic medical assistants could carry out case finding at the secondary level. As a part of their training, these cadres of eye workers should be trained to case find glaucoma by:

1. Discoscopy and measurement of the vertical cup : disc ratio.
2. Tonometry (either Schiotz or applanation).

- IOP on Schiotz tonometry <28mmHg + vertical cup : disc ratio <0.6 → 'normal'
- IOP on Schiotz tonometry ≥28mmHg + vertical cup : disc ratio <0.6 → 'suspect case' → refer to tertiary level for confirmation of diagnosis and treatment
- IOP on Schiotz tonometry <28mmHg + vertical cup : disc ratio ≥0.6 → 'suspect case' → refer to tertiary level for confirmation of diagnosis and treatment
- IOP on Schiotz tonometry ≥28mmHg + vertical cup : disc ratio ≥0.6 → 'diagnosed case'→refer to tertiary level for confirmation of diagnosis and treatment.

All persons 40 years and over who are seen by secondary level eye workers for whatever reason could be screened for glaucoma in this way as a part of their routine examination, and this screening could be done at least once every 2 years. While it would be possible for presbyopia to be treated at the primary level, confining this to the secondary level would provide good opportunity for glaucoma case finding in these patients.



Cupping of the optic nerve head

Graphics: Hugh Lugg
Photos: Pak Sang Lee, Gordon Johnson & Moorfields Eye Hospital

Confirmation of Diagnosis at the Tertiary Level: How Should This Be Done?

All 'suspect cases' and 'diagnosed cases' should be seen by the eye doctor at the tertiary level, for confirmation of the diagnosis and then for treatment. Visual field testing should confirm the diagnosis, but it may be impractical and unreliable in some patients. If it is considered inappropriate to use these, it would be necessary to rely on tonometry and discoscopy.

Treatment at the Tertiary Level: Should it Be Medical or Surgical?

What are some of the arguments in favour of medical treatment?

- It avoids the inconvenience and expense of surgery, and it avoids the risks of surgery.

What are some of the arguments against medical treatment?

- It is expensive, it is life-long, it is inconvenient, it may cause unpleasant side effects, the treatment regimens may be confusing, it may be difficult for patients to collect and to store their medicines, patient compliance is poor, and it may be difficultfor theservice providerto ensurereliable supplies ofthemedicines.

Proposal: What About a Glaucoma Surgery Rate (GSR)?

We have a 'cataract surgery rate' that we use for the planning of our cataract services. Would it be helpful to use a 'glaucoma surgery rate' for the planning of our glaucoma services?

If we make a number of assumptions, we could derive such a 'GSR' as follows:

1. For a population of one million people, the population over 40 years who are at risk is 25% = 250,000.
2. The prevalence of glaucoma in people over 40 years is 1-2% = 2,500 – 5,000 cases (in Africa, the prevalence could be double this rate).
3. Of the 5,000 cases, 50% have early glaucoma, 10% are already blind, and 40% (2,000 cases) have moderate, detectable, and treatable glaucoma.
4. As patients develop glaucoma, they progress slowly through the early to the intermediate to the late phase of the disease. If it takes 10 years to progress from 'onset of disease' to 'blind', it takes 4 years to progress through 'moderate / intermediate disease'.
5. Cases with moderate / intermediate disease are the priority target group for community case detection and surgery.
6. Therefore, each year the glaucoma surgery rate should be 500 per million population.

Whilst there are still too many assumptions about the prevalence, incidence, and rate of progression of the disease to be able to derive a reliable glaucoma surgery rate, this figure of 500 per million population per year is a conservative estimate of the numbers of glaucoma surgeries that we probably should be doing.

What are some of the arguments against surgery?

- It is inconvenient, it is expensive, it carries risk, and there may be failure of the surgery.

What are some of the arguments for surgery?

- It is less expensive than medical treatment in the long run, there is better control of the intraocular pressure compared with medical treatment, and there is less visual field loss compared with medical treatment.

After weighing up the arguments for and against medical and surgical treatment:

1. In our blindness prevention programmes, glaucoma should be considered primarily a 'surgical' rather than a 'medical' condition.
2. Primary trabeculectomy (with adjunctive treatment with cytotoxic drugs or beta – irradiation, using a strontium 90 plaque if there is a risk factor for bleb fibrosis and failure) should be the first line of treatment.
3. Medical treatment should be reserved for 'failure' of surgical treatment (that is, bleb fibrosis and failure or inadequate intraocular pressure control following trabeculectomy).

Summary of an Approach to Glaucoma in a Blindness Prevention Programme

1. For a population of one million people, there are an estimated 2,000 people with moderate, detectable, and treatable glaucoma.
2. Case finding at the primary level can be undertaken by:
   - Testing the visual acuity and examining the colour of the pupil
   - All people who are 40 years and over who are seen for whatever reason should be screened
   - Reduced visual acuity + black pupil = 'black blindness' (glaucoma); refer to secondary level.
3. Case finding at the secondary level can be undertaken by:
   - Tonometry and discoscopy
   - All people who are 40 years and over who are seen for whatever reason should be screened
   - Cases should be categorised as 'normal', 'suspect case', and 'diagnosed case' according to the intraocular pressure (< 28mmHg, or ≥28mmHg) and the vertical cup: disc ratio (<0.6, or ≥0.6)
   - 'Suspect cases' and 'diagnosed cases' should be referred to the tertiary level.
4. Confirmation of diagnosis at the tertiary level may be done by repeat examination, with or without visual field examination.
5. Treatment of glaucoma should be as follows:
   - Primary trabeculectomy, with adjunct if indicated, should be the first line of treatment (the glaucoma surgery rate should be 500 per million population per year)
   - Medical treatment should be used if there is inadequate intraocular pressure control following trabeculectomy.
6. Patients whose intraocular pressures have been adequately controlled following trabeculectomy should be followed up at the secondary level at regular 6 monthly intervals. The keeping of a glaucoma register would ensure that no patients are lost to follow-up.

What About Follow-up?

Patients who have had surgery could be followed up at the secondary level. Assuming adequate intraocular pressure control, they could be seen at regular 6 monthly intervals, when their examination should include measurement of the visual acuity, tonometry, and discoscopy.

The ophthalmic nurse / ophthalmic medical officer could keep a register of glaucoma cases in their health district, so that patients can be contacted if they fail to attend for follow-up.

Relatives of patients with glaucoma should attend for assessment. ❑

International Glaucoma Association

The International Glaucoma Association, a registered charity based in London, is a membership organisation with 26 years experience in helping people with glaucoma.

The aims today are the same as those of 26 years ago, when our founders and first members, a group of patients, doctors and medical staff at Kings College Hospital, London gave us a vision in our articles of association:

- To preserve sight by the education of patients,the public,medical practitioners and allied professions in the problems of glaucoma, especially (but without limiting the generality of the foregoing) those problems involved in its early recognition and the maintenance of a high standard of treatment
- To advance or facilitate research into the causes, treatment and alleviation of glaucomaandtoensurethedissemination of the results of such research to the professions and the public.

In many cases, lack of awareness, knowledge or support canbecome a major factor in the deterioration of any medical condition.

Failure to understand the need for early detection and effective treatment leads to much unnecessary blindness in the world today. The Association is developing a number of different initiatives to provide information to the public and professionals alike wherever they may be. Further, we have an international individual personal and professional membership together with an affiliate programme for similar organisations anywhere in the world.

Our information service and support to the community is, we believe, second to none:

- Our website at www.iga.org.uk which receives over 30,000 enquiries a month
- Our Sightline on (+44) 207 737 3265 (09.30 to 17.00 GMT)
- Over the internet from info@iga.org.uk

These services are supported by a range of leaflets (developed from the questions of our friends and members to our Sightline) which are freely available to all.

Over the last year we have been improving our systems so as to be of service to more people. These developments will be implemented and available over the next year tosupportallthose whoneedourhelp.

As a charity we are funded entirely by the donations of our members, friends and the general public. This generosity from those we have helped and colleagues enable us to fund our information services and helpline, run awareness campaigns and research into the causes and treatment of glaucoma.

The vision and spirit of service of our team; members, friends, donors,doctors and staff has not changed in a new century – we are willing and able to help those who need our help.

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Causes and Visual Outcomes of Perforating Ocular Injuries among Ethiopian Patients

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Introduction

Ocular trauma, in particular open globe injury, is an important cause of monocular visual impairment and blindness in the younger and economically active age group.[1] Besides loss of vision, earnings (job opportunities) and productivity, it increases the cost to society because of increased healthcare spending.

Although it affects all age groups, previous reports have indicated that ocular trauma victims are predominantly males and young, with the majority under 30 years of age. In those between 20 and 44 years of age, injuries account for 10% of incident bilateral blindness.[1]

The magnitude of ocular injuries in our country has not been studied previously. This review was conducted to assess the magnitude, causes and visual outcomes of ocular trauma cases at Menelik II Hospital in Addis Ababa.

Patients and Methods

All patients with open globe injury who were operated on at the Department of Ophthalmology, Faculty of Medicine of Addis Ababa University, Menelik II Hospital, Addis Ababa over a one year period (January 1998 – December 1998) were reviewed.

The chart numbers of patients with open globe injury were obtained from the registry book of the major operating room. In addition to those obtained from the operating room registry book, data such as cause, date and duration of injury, visual acuity, type and extent of injury, medical treatment given before surgery, and profession of the patient were documented.

Finally, analysis was made as to the age and sex distribution, post-operative complications, visual outcome of open globe injury and duration of follow-up. The patient was categorised as monocular blind if the visual acuity of the injured eye was less than 3/60 (or counting fingers (CF) at less than 3 metres). However, the new standardised ocular trauma classification [2] was not applied and as a result was not used in this analysis.

Results

Two hundred and four patients with perforating ocular injuries underwent surgery during the study period. All had injury to only one eye. Of the total eye operations done in the major operating room during the study period, 8.4% were due to perforating ocular injury. Male patients were threetimesthenumberoffemales,asshown in Table 1. The age ranged between 1.5 and 65 years, with the average being 19.4 years. One hundred and fifty-four (75.5%) patientswereaged30yearsorunder.

The most common causes of perforating ocular injuries were wood, metal and stone objects in 67 (32.8%), 58 (28.4%) and 29 (14.2%) respectively (Table 2). Most of the injuries occurred during chopping or cutting wood, hammering metals or nails and carving stone. These are associated with professions such as farming, garage work and carpentry in adults. Children, on the other hand, mostly sustained accidental injuries by rubber bands, needles, pencils, etc. while playing with others.

In the majority of cases, 151 (74%), the cornea was involved either alone (40 cases) or in association with the lens (88 cases) or the sclera (23 cases), as seen in Table 3. Twenty patients (9.8%) were too young to have their visual acuity taken. Of the remaining 184 patients, 165 (89.7%) had pre-operative visual acuity recorded as blind in the involved eye (Table 4). Post-operatively, 141 (76.6%) cases had visual acuities of less than 3/60 (CF < 3 metres). Thirty-nine (19.1%) cases with ruptured globe were eviscerated.

Discussion

A hospital based study[3] has revealed that severe injuries such as ruptured globe, intraocular foreign bodies, hyphaema and orbital or facial fractures constitute about 5% of all ocular trauma cases. In this study, only perforating ocular injuries were looked at rather than the whole spectrum of eye trauma cases. However, ocular injury cases constituted 8.4% of all ocular operations performed in the major operating room during the study period.

Although it affects all age groups, previous reports have indicated that ocular trauma victims are predominately young with a majority under 30 years of age. Males greatly outnumber females as victims of eye injuries with a male to female ratio ranging from 3:1 to 12:1[4,5] and the greatest number of eye injuries occurred in school-age children.[6] Our results were in agreement with this trend as 75.5% of the cases were males and 75.5% were also aged 30 years or under.

Work-related injuries are described as the commonest cause of ocular trauma among adults.[3,5] On the other hand, the most common cause of paediatric injuries were accidental blows and falls. Industrial injury to the eye is rare in our country, and here the major causes were related to farming, carpentry or garage work.

The visual outcome of perforating ocular injuries depends on the type of trauma sustained. Injuries from sharp objects have a better prognosis compared with those caused by blunt objects. This is because sharp objects cause laceration with damage confined to the underlying tissue whereas those caused by blunt objects result in widespread damage which, in the case of sufficiently high force, may rupture the globe.

The severity of trauma is also among the prognostic factors used to predict the final visual outcome. Injuries associated with a wound 4mm or longer,[3] combined anterior and posterior segment injuries,[5] lens dislocation, vitreous haemorrhage, intraocular foreign bodies, scleral wounds and afferent pupillary defect [7] were found to have poor prognoses. In this retrospective review, the severity of injury was difficult to ascertain.

Previous studies [5,7,8] have indicated that an initial visual acuity of the traumatised eye has a predictive value in regard to the final visual outcome. They showed that initial visual acuity of 5/200 (1.5/60) or better was associated with a favourable prognosis.

The management of ocular injury seeks to restore the anatomy and function of the eye to its pre-injury state. Visual rehabilitation of the injured eye often requires the involvement of several sub-specialists. Diagnostic means such as ultrasonography and radiography need to be readily available with trained personnel.

About 2/3 of our patients remained blind in the injured eye. This was due to failure to manage the complications of injury. We do not have trained personnel in corneal transplantation. We also lack a vitreo-retinal surgeon to manage vision threatening posterior segment injury such as vitreous haemorrhage or retinal detachment. In our cases, 89.7% were blind before surgery as opposed to 76.6% after surgery to the injured eye. The improvement in the visual acuity of some patients was due to cataract extraction with lens implantation performed in these cases.

The Department is a tertiary centre where patients are referred for better management. Efforts must be made to strengthen the capacity of the Department to handle perforating ocular injury cases appropriately.

Table 1: Age and Sex Distribution of Cases with Ocular Injury

Age (yrs.)	Sex		Total (%)
	Male	Female	
<10	43	20	63 (30.9)
11-20	42	8	50 (24.5)
21-30	33	8	41 (20.1)
31-40	18	10	28 (13.7)
41-50	13	3	16 (7.8)
51-60	3	0	3 (1.5)
61-70	2	1	3 (1.5)
Total	**154 (75.5%)**	**50 (24.5%)**	**204 (100%)**

Table 2: Causes of Injury

Cause	No. of Cases (%)
Wood	67 (32.8)
Metal	58 (28.4)
Stone	29 (14.2)
'Man-induced'	18 (8.8)
Miscellaneous causes (glass, fall, rubber, pencil, animal, explosive)	20 (9.8)
Unknown	12 (6.0)
Total	**204 (100 %)**

Table 3: Anatomy of Eye Injuries

Types	No. of Patients (%)
Cornea	40 (19.6)
Cornea + Lens	88 (43.1)
Corneo + Sclera	23 (11.3)
Sclera	14 (6.9)
Ruptured globe	39 (19.1)
Total	**204 (100 %)**

Table 4: Pre-operative and Post-operative Visual Status of the Eyes

Visual Acuity	Initial (%)	Final (%)
NLP	39(21.2)	39(21.2)
LP	87(47.3)	30(16.3)
CF < 3 metres	39 (21.2)	72(39.1)
CFat 3 metresorbetter	19(10.3)	43(23.4)
Total	**184(100%)**	**184(100%)**

References

1 Tielsch J M, Parvel L, Shankar B. Time trends in the incidence of hospitalised ocular trauma. *Arch Ophthalmol* 1989; **107**: 519–523.

2 Kuhn F, Morris R, Witherspoon C D, et al. A standardized classification of ocular trauma. *Ophthalmology* 1996; **103**: 240–243.

3 Schein O D, Hibberd P L, Shingleton B J, Kunzweiler T, Frambach D A, Seddon J M, Fontan N L, Vinger P F. The spectrum and burden of ocular injuries. *Ophthalmology* 1988; **95**(3): 300–305.

4 Eagling E M. Perforating injuries of the eye. *Br J Ophthalmol* 1976; **60:** 732–736.

5 Quah B L, Yeo Y S I, Ang C L. A retrospective study of open globe injuries seen at Singapore National Eye Centre (SNEC) in 1995. *Asia-Pacific Journal of Ophthalmology* 1997; **9**(2): 18–23.

6 Strahlman E, Elman M, Daub E, Baker S. Causes of pediatric eye injuries: A population based study. *Arch Ophthalmol* 1990; **108**(4): 603–606.

7 Juan E D, Sternberg P, Michels R G. Penetrating ocular injuries: Types of injuries and visual results. *Ophthalmology* 1983; **90**(11): 1318–1322.

8 Williams D F, Mieler W F, Abrams G W, Lewis H. Results and prognostic factors in penetrating ocular injuries with retained intraocular foreign bodies. *Ophthalmology* 1988; **95**(7): 911–916.

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The Elim Care Groups: A Community Project for the Control of Trachoma

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Introduction

The Far North of South Africa, where Elim Hospital is situated, has been known as the trachoma belt. The disease was the main cause of preventable blindness in the area. In the 1970s the local epidemiological pattern of trachoma was studied in the region served by Elim Hospital.[1] Several randomised population surveys were carried out, and the results indicated that preschool children aged 2–4 years represented the main reservoir of infection in the community; that spontaneous cure tended to occur at school-going age; and that repeated re-infections later in life eventually led to blinding complications, especially in women tending young children (Fig.1). Men who were absent from their homes most of the time as migrant labourers, were much less affected. These findings explained why many years of school treatment schemes had not reduced the overall prevalence of intense trachoma and its complications in the population, as preschool children continued to spread the disease. Hence, measures to control trachoma should have two main goals. First, to reduce the infective load in the community by treating young children with tetracycline eye ointment. Second, to prevent re-infection by motivating mothers to improve hygienic conditions in their homes. This rationale led us to involve the communities themselves in the control of trachoma.

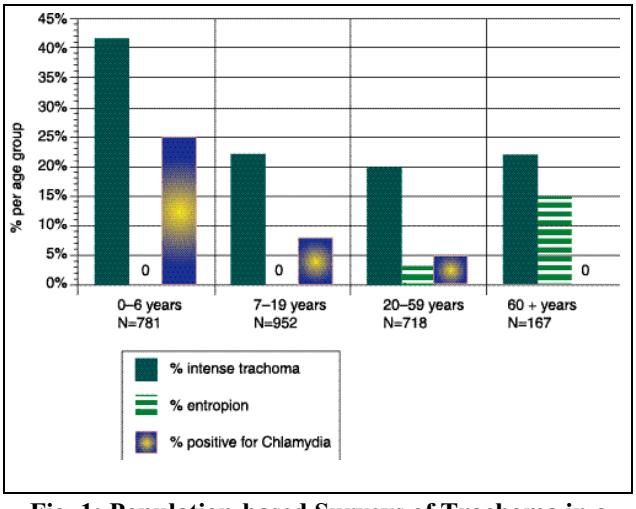

Fig. 1: Population-based Surveys of Trachoma in a Rural South African Community

Approaching the Community

The project was set up in 1976 to establish groups in villages in the area around the hospital. Because the majority of the men were working in distant cities, the groups, later called Care Groups, were mostly joined by women. The Project Co-ordinator, based in the hospital, was assisted by a number of Motivators. The idea spread very rapidly, and by the end of the first year 24 of the approximately 80 settlements served by the hospital already had a Care Group.

Trachoma was well known in the area, and the people were concerned about it. Several popular beliefs about the disease, handed down over many generations, testify to this concern. Some examples illustrate the remarkably accurate observations, which have become disguised in so-called superstition. For example, people insist that every child should have 'mavoni', i.e., discharging eyes in childhood, in order to see well later in life. In fact, the majority of children acquire trachoma within the first three years of life, and by the time they go to school the disease has usually resolved without affecting vision. Also, it was said that a multiparous woman who fails to inform her mother-in-law about her new pregnancy will get eye trouble after the birth of the child and her mother-in-law will get 'xinyeku', that is entropion, or will go blind ('mahlo ya xidzhwele'). Obviously people have observed that blinding complications occur most frequently in large families with many children – a fact we also found in our surveys.[2] Finally, the word 'xinyeku' is also used to describe a careless, poor and untidy woman, i.e., entropion has long been associated with poor hygienic conditions favouring re-infection with *Clamydia trachomatis*.

Health education could thus be built upon traditional wisdom, and the feeling that their ideas were respected won the people's trust and interest. Mothers were keen to learn more about the nature and spread of trachoma in order to protect their own and their neighbour's children from infection. Thus, starting in three villages, interested women joined together to form Groups of unpaid volunteers. Their aim was to improve health and the quality of life in their homes and in their community. In most cases they started with trachoma and later moved on to general health and development.

Good standards of personal hygiene
Photo: Erika Sutter

The Groups chose their own steering committees which formed the liaison between the Groups and the hospital-based project leadership, i.e., the Co-ordinator and the Care Group Motivators. The Motivators visited the Groups regularly for ongoing health education and discussions. Alternatively, the Clinic Nurse or the Community Health Worker took care of the local Group.

The Training of Care Groups

Working with communities is bound up with a long learning process for organisers, facilitators and the people in the community. There is no room here to discuss this process at length.[3] Instead we shall confine ourselves to the methods and outcome of health education concerning trachoma.

Having tried both nurses and less educated assistant nurses as Care Group Motivators, we found that the latter were suited for this particular task. They were local people with limited schooling, and were thus culturally nearer to the villagers and related easily to them. In many respects they were more innovative than their seniors who had had more formal education. However, even these Motivators had first to go through a lengthy process of 'un-learning' to become

proficient health educators, because their own educational experience had been authoritarian one-way instruction. Then, they learnt the skills of leading group discussions, awareness building and encouraging the women to find their own solutions to their problems. There was all too little guidance for them in the beginning, but in spite of this, most managed remarkably well to improve their methods. They soon realised that routine health talks did not change people's behaviour. The women needed ample time to absorb the message, ask questions, argue and discuss until every one understood and agreed on action to be taken. In addition, grandmothers had to be drawn in and given an opportunity to voice their opinion. On their own initiative, Motivators visited old folk in villages, discussed with them their traditional way of life and asked them for advice. This good relationship made it easier for young mothers to introduce new methods in their homes, where traditionally the mother-in-law is dominant. This kind of give and take is only possible in smaller groups like the Care Groups, and is more promising than health lectures to larger audiences where there is little personal commitment.

Care Group members, in their turn, were well motivated to apply their new knowledge, because most were in some way affected by the problem trachoma caused, and, moreover, they had struggled in their discussions to find their own solutions. They also discussed their difficulties amongst themselves and helped each other to introduce the necessary change in their homes. Thus, the famous KAP-gap (Knowledge, Attitude, Practice) was overcome with relative ease, at least when changes were within the limited financial and social possibilities of the Group members.

As mentioned earlier, treating young children and avoiding re-infections were the cornerstones of the control of blinding trachoma. Since the supply of tetracycline eye ointment was seldom adequate, we were forced to limit treatment to a few selected settlements. The main emphasis was therefore directed towards the improvement of hygienic practices. These included digging refuse pits and erecting toilets to reduce the fly population, and washing face and hands frequently. At that time people had already stopped washing themselves with their bare hands and had adopted the 'more distinguished' Western face cloths. In practice one single cloth was shared by the whole household, thus transmitting *Chlamydia trachomatis* from eye-to-eye. The health message had, therefore, to stress the use of individual cloths – any piece of rag would do, as long as it was clean.

In addition to health education for disease prevention and health promotion, the Group members were also taught to instil eye ointment. When shown what trachoma looks like they too wanted to learn to evert the upper eyelid so that they could identify cases in their neighbourhood. After having verified that they were careful about washing their hands each time before touching an eye, and performed the procedure gently and correctly, we allowed them to go ahead with case finding. This was a great encouragement to their self-confidence.

Trachoma Control by the Care Groups in their Communities

The Groups understood that keeping their own homesteads clean was no guarantee of avoiding infection as long as the rest of the village did not do the same. It was, therefore, very important to share their new knowledge with everyone else in their community. Each Group developed its own method of communication. Most found that it was best to make home visits in small groups where they could support each other and were better received by the villagers than when they went individually. Other Groups made up their own health songs and went singing and dancing through the village, arousing the curiosity of the villagers, who then joined the dancers. When the crowd was big enough Group members told the audience what they had learnt. At many festive occasions in the community, Care Groups performed sketches about health. Some Groups decided on their own to visit the local school and instruct and examine the school children, and others talked to waiting mothers at the child health clinic.

In the beginning people were not sure whether they could trust a fellow villager who had as little school education as they had or was even illiterate. But soon they realised that these women had learnt much from their Motivators, and so people began to listen to the Care Groups. The health messages were easy to understand, because they were practical, addressed common communityproblemsandweredelivered in the villager's every day language. Furthermore, people could watch progress made in the homesteads where Care Group members were practising what they had learnt.

Care Group members were no different to the rest of their community, and struggled like the others to survive under the prevailing conditions of poverty and lack of infrastructure, water, fuel and jobs. Their example was thus made more convincing, having significant influence in the community, so that the villagers felt motivated to compete with their neighbouring Care Group members. In our experience Care Group members proved to be more believable and more successful than professional health workers with higher educational standards, who came from outside the community, and after the job was done returned to homes with running water, bathroom and toilet.

The health messages spread fast throughout the communities. After about a year most people understood the dangers of trachoma, how it was transmitted and what to do for its prevention. Many villagersbegantosetnewpriorities,especially for the proper use of the little water which was available. As they became conscious about the importance of face washing, water was set aside for this purpose, and afterwards used to water the vegetables. Refusepitsweredug,andsometoiletswere erected, though too few, because material was too expensive. Even in very poor settlements the appearance of the homesteads improved. Fig. 2 shows the effect Care Groups had in their communities on hygienic practices and on knowledge about trachoma.[4]

Although the Groups' activities were predominantly preventive and promotive, according to their slogan, 'Cleanliness is the best medicine', their message had to be supported by curative care when necessary. The occasional supply of tetracycline eye ointment to the Groups was always encouraging, for both the Groups and the community, because they could then actually carry out treatment. In addition, the hospital strengthened the Care Groups' credibility by a two-way referral system.

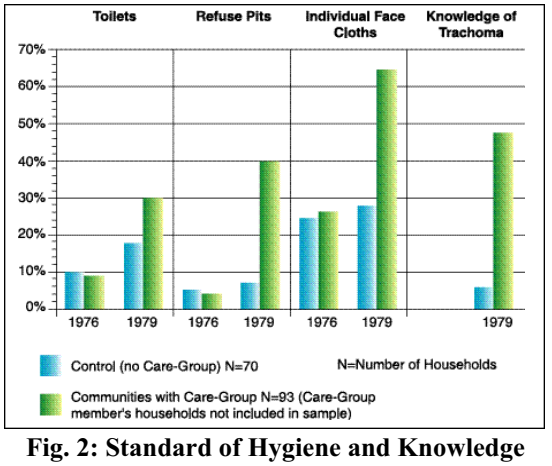

Fig. 2: Standard of Hygiene and Knowledge about Spread of Trachoma before (1976) and after Care Group Activity (1979)

Groups were allowed to refer patients to the clinic or to the eye hospital for treatment, and the hospital referred trachoma cases to the patients' local Care Group for further health education. The same system was later used for malnourished children. In a few places where the prevalence of trachoma was especially high, mass treatment through the local Care Group was organised to cover the whole community. But even with no, or only occasional treatment, prevalence decreased significantly in settlements where Care Groups were active, while there was no change in comparable villages which had no Group.[4]

After 3–4 years the Groups abandoned their preoccupation with trachoma, as they were satisfied with the results of their campaign, and turned to general health care, vegetable gardening and community development. Our fear, that the incidence of trachoma could rise again when the Groups discontinued their specific preventive activities against the disease, was not substantiated. On the contrary, its prevalence continued to fall.[5] This is demonstrated in Fig.3, where all population surveys on trachoma in the area where Care Groups operated have been summarised. After 5 to 10 years trachoma was no longer blinding, and had ceased to be a public health problem. Accordingly, patients with entropion presenting at the hospital had become rare. This development was surprising, as unemployment and poverty in the area was rather on the increase. Other factors may also have contributed to the control of the disease, such as improved water supply and a general change in people's attitudes, which meant that despite low incomes, better housing and improved hygienic standards were considered to be important. Unfortunately, it has not been possible to perform control studies in comparable regions which had no Care Groups,toexcludeconfounding factors.

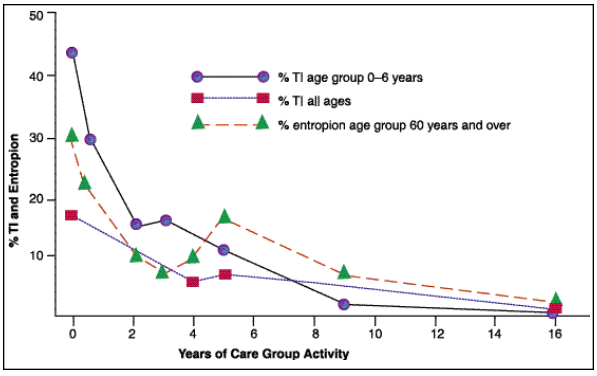

Fig. 3: Prevalence of Trachoma (TI) and Entropion in Relation to the Duration of Care Group Activity in the North of South Africa (1976–1995)

Conclusion

The impact of Care Group activity on the improvement of health factors such as personal and environmental hygienic conditions or the prevalence of trachoma has been measured, and proved to be statistically significant. However, social and human values which determine the quality of life, even more than health does, cannot be measured and expressed in actual figures. Over the years we observed many remarkable changes in the Care Group members' attitudes to themselves and their communities. They discovered their skills as health advisors, in problem solving and in leadership, and experienced that as a Group they were strong and could achieve much. This boosted their self-confidence and helped them to regain their human dignity as Black rural women, which the discriminatory tribal and apartheid society had denied them.

Now, more than 20 years since its beginning, the Care Group Project is still thriving and continues to adapt to the changing needs.[6] There are Care Groups in almost every settlement in the region, amounting to approximately 250 Groups with a total of 10,000 women. The Project differs from the majority of other community health institutions in its emphasis on Group action rather than individual health workers. Such a system is more stable, especially as the Groups are networking with each other, aided by strong and capable regional management teams composed of Care Group members, who have taken over responsibility for the Groups in their area. Thus, variation in motivation or changing interests can more easily be accommodated. The continuous presence of the Groups and the size and popularity of the movement have contributed to an ongoing high level of health consciousness in the population.

References

1 Ballard R C, Sutter E E, Fotheringham P. Trachoma in a Rural South African Community. *Am J Trop Med Hyg* 1978; **27** : 113–120.
2 Ballard R C, Fehler H G, Sutter E E, Treharne J D. Trachoma in South Africa. *Soc Sci Med* 1983; **17** : 1755–1765.
3 Sutter E, Foster A, Francis V. Hanyane, a Village Struggles for Eye Health. Macmillan Publishers, London, 1989.
4 Sutter E E, Ballard R C. Community Participation in the Control of Trachoma in Gazankulu. *Soc Sci Med* 1983; **17** : 1813–1817.
5 Ijsselmuiden C B, Bucher P J M, Baloyi C T, Sutter E E. Unpublished study, 1985.
6 Sutter E, Ijsselmuiden C. Still going after all these years …?! *Bull medicus mundi* 1998; **69**: 12–15.

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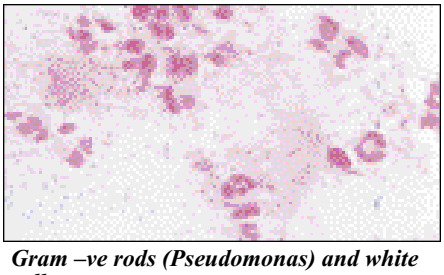
Suppurative Keratitis

AK Leck, MM Matheson, J Heritage

A laboratory manual and guide to management of microbial keratitis



Gram –ve rods (Pseudomonas) and white cells

Photo: Melville Matheson

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A very useful and much-needed guide with colour photographs. The 25-page manual has the following sections:

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- Gram Stain
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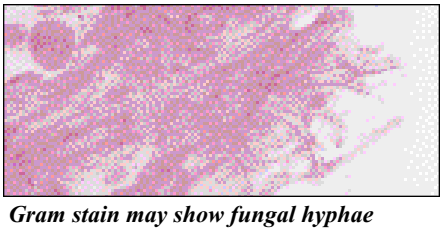
- Culture techniques
- Schematic guide to identification of common causative organisms
- Fungal culture/Filamentuous fungi
- *Acanthamoeba sp.*
- Treatment recommendations



Gram stain may show fungal hyphae

Photo: Melville Matheson

Evaluation of a National Eye Care Programme: Re-survey after 10 Years

Hannah Faal
Darwin C Minassian
Paul J Dolin
Abdirisak A Mohamed
Jeff Ajewole
Gordon J Johnson

Aim: To re-survey the Gambia after an interval of 10 years to assess the impact of a national eye care programme (NECP) on the prevalence of blindness and low vision.

Methods: Comparison of two multistage cluster random sample surveys taking into account the marked increase in population in the Gambia, west Africa. Samples of the whole population in 1986 and 1996 were taken. The definition of blindness is presenting vision less than 3/60 in the better eye, or visual fields constricted to less than 10° from fixation. Low vision is less than 6/18 but 3/60 or better. Causes of blindness were determined clinically by three ophthalmologists.

Results: The crude prevalence of blindness fell from 0.70% to 0.42%, a relative reduction of 40%. During the same 10 year period, the population increased by 51% from 775,000 to 1,169,000. When the results were standardised for age, a west to east gradient was found for changes in risk of blindness over the 10 year period. This matched the phased west to east introduction of the NECP interventions. There was a modest but significant increase in the risk of low vision across the whole country.

Conclusions: The overall reduction in risk of blindness, in those areas where the NECP has been active, appears to justify the programme and the support of donor organisations. The low vision cases due to cataract must now be addressed.

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Patterns of Open-angle Glaucoma in the Barbados Family Study

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Barbara Nemesure
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James Fielding Heftmancik
Anselm Hennis

Objective: To describe the Barbados Family Study of open-angle glaucoma (OAG) and present risk factors for OAG in siblings of study probands.*

Design: Observational study of families of probands with OAG.

Participants: Twohundredthirtyprobands and 1056 relatives (from 207 families).

Methods: Probands and their family members underwent standardized examinations, including automated perimetry, applanation tonometry, ophthalmologic evaluation, fundus photography, blood pressure, interview, and genotyping. Generalized estimation equation methods were used to evaluate risk factors in the siblings, including demographic, medical and ocular characteristics.

Main Outcome Measures: Presence of OAG in the relatives, as defined by both visual field and optic disc findings, after ophthalmologic exclusion of other causes.

Results: The median ages of probands and relatives were 68 and 47 years, respectively. In the 207 families, 29% of the probands had one relative with OAG and 10% had two or more relatives affected. Of the 1056 family members, 10% had OAG, 13% had suspect OAG, and 6% had ocular hypertension. One fifth of the 338 siblings had OAG (n = 67); they tended to be older and more often were male. Multivariate comparisons between siblings with and without OAG found that age, higher intraocular pressure (IOP), myopia, and lower diastolic blood pressure – IOP differences were related to OAG, whereas hypertension and diabetes were not.

Conclusions: Based on standardized protocols and examinations, approximately one quarter of the relatives had OAG or suspected OAG, despite their relatively young age. Risk factors for OAG in siblings were similar to risk factors in unrelated individuals. Although definitive conclusions about the extent of OAG among the relatives are not possible at this time given their relatively young age, a future follow-up of these individuals may yield additional information on the genetic transmission of OAG. Analyses are ongoing to determine OAG inheritance and to localize potential gene(s) involved.

Published courtesy of :
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[* Proband – a person with, e.g., a physical disorder, who is a 'starting point' for a genetic study – Editor]

Prevalence of Glaucoma in a Rural East African Population

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Yolanda Barron
Sheila K West
Matthew S Oliva
Boliface B O Mmbaga

Purpose: To determine the prevalence of glaucoma in an adult population in rural central Tanzania.

Methods: Six villages were randomly selected from eligible villages in the Kongwa district, and all residents more than 40 years of age were enumerated and invited to a comprehensive eye examination including presenting visual acuity, refraction, automated 40-point Dicon (San Diego, CA) suprathreshold screening field test, Tono-Pen (Bio-Rad, Inc., Boston, MA) intraocular pressure (IOP) measurement, and standardized examination by an ophthalmologist of anterior segment, optic nerve head, and retina after pupil dilation. Gonioscopy and Glaucoma-Scope (Ophthalmic Imaging Systems, Sacramento, CA) optic disc imaging were performed on those with IOP higher than 23 mm Hg and cup-to-disc ratio (c/d) more than 0.6 and on a 20% random sample of participants.

Results: Of 3641 eligible persons, 3268 (90%) underwent ophthalmic examination. The prevalence of glaucoma of all types was 4.16% (95% confidence interval [CI] = 3.5, 4.9%). Primary open-angle glaucoma (OAG) was diagnosed in 3.1% (95% CI = 2.5, 3.8%), primary angle-closure glaucoma (ACG) in 0.59% (95% CI= 0.35, 0.91%), and other forms of glaucoma in 0.49%. The prevalence of glaucoma was found to be sensitive to changes in the diagnostic criteria.

Conclusions: The high prevalence of OAG in this group was similar so that of African-derived persons in the United States but less than in African-Caribbean populations. ACG was more prevalent in east Africans than suggested by anecdotal reports.

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Update on Ocular Leprosy

Dear Editor

The report by Professor Gordon Johnson and the recommendations by Dr Paul Courtright summarise beautifully the Workshop on Practical Eye Care GuidelinesforLeprosyPatients. (*J Comm Eye Health* 2001; **14**: 25–26).

In addition, I would like to clarify one point on treatment of lagophthalmos:

Recent lagophthalmos, independent of size of lid gap, should be treated first with a course of systemic steroids as per general guidelines for type 1 reaction and recent nerve damage in leprosy. Usually a durationofnervedamageof≤6 months, is taken as indication for steroid treatment in leprosy.

Even recent lagophthalmos with a lid gap of 8–10 mm in mild closure may recover, provided steroid treatment is given in time. Meanwhile the cornea should be protected by conservative means in combination with blinking exercises.[1]

Reference

1 Treatment of recent facial nerve damage with lagophthalmos, using a semi-standardized steroid regimen. Kiran KU, Hogeweg M, SuneethaS. *LeprosyReview* 1991; **62:** 150–154.

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Cataract Surgery

Dear Editor

Cataract Surgery in Developing Countries

I wish to write in response to the expressions of various ophthalmologists published in the last issue of the *Journal of Community Eye Health* 2001; **14:** 30–31, on the method of cataract surgery in developing countries.

It seems that couching is still practised in some parts of the world with better results than ICCE. Because the advantages of ECCE + PCIOL can hardly be exaggerated,themajorityofnewlytrained eye surgeons perform ECCE more confidently than ICCE even in developing countries.Sofarastheissueofavailability of YAG laser is concerned, the use of primary posterior capsulotomy can be advocated to avoid its need.

In Nepal, for example, you can hardly find anybody who would be doing ICCE either in outreach camps or in the hospitals. It would be incredible to think of this 10 years ago! I do not believe that ICCE can be done faster than ECCE + PCIOL once one starts doing it.

Nepal's experience in developing eye care infrastructure for cataract surgery through coordination with the NGOs and INGOs can be an example for many developing countries with huge cataract backlogs.

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Dear Editor

I agree with John Standford-Smith (*J Comm Eye Health* 2000; **13**: 62) that intracapsular cataract extraction (ICCE) has been relegated to the history books without necessary discussion taking all the facts into account.

Like others in the 80s, I trained to do ICCE using a loop. We face the choice of having to retrain to carry out ECCE + PCIOL, or continue to practice what is increasingly regarded as a substandard technique.

While ICCE has its complications (vitreouslos s, macularoedema,retinaldetachment, etc.), so does ECCE even when performed in good conditions (posterior capsule opacification, etc.). Perhaps the truth is that all methods can give suboptimal results despite the best of intentions.

At the Bamako, Mali, launch of Vision 2020, Dr Daniel Ety'aale of the WHO, reminded delegates that the majority of ophthalmologists in Francophone West Africa had only been trained in ICCE.

As John Standford-Smith suggests, anterior chamber IOLs are a useful way forward, enabling surgeons doing ICCE to offer their patients the benefits of pseudoaphakia.

Another factor in the ICCE/ECCE debate is cost. To set up for ECCE + PCIOL requires more expensive equipment than for ICCE+ACIOL (microscope, YAG laser, etc.) The extra consumables for ECCE+PCIOL are more expensiveandlesseasilyproducedlocally (Ringer's lactate solution, methyl cellulose, nylon sutures, maintenance of expensive equipment, etc.). The main consumables for ICCE + ACIOL are the cryo refrigerant and the sutures. Now that ozone friendly refrigerants are available in many African cities, this is less of a problem.

Also, certain types of cataract such as intumescent with a tough capsule, hypermature with a shrivelled cortex are better dealt with by ICCE. In this part of Africa, these types of cataract are still very common.

Perhaps we need a certain amount of humility in realising that a mixture of methods is needed to deal with the many varied types of cataract that we meet. We also need to take into account what our patients can realistically afford.

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Eye Surgery in Hot Climates 2nd Edition

JOHN SANDFORD-SMITH
FRCS FRCOphth

Published by
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and
International Centre for Eye Health

In the Vision 2020 campaign to eliminate global avoidable blindness, surgery plays a major part, especially for cataract and for trachomatous trichiasis. If elimination is to succeed, we need a great increase very soon in the number of people who can carry out safe eye surgery. Much surgery has to be done in remote and resource-poor places with little support. This is the aim of the book and it succeeds.

Anyone familiar with the first edition will know its clear and detailed descriptions of a wide range of eye operations, and its good line drawings. There is also coverage of 'background' subjects like theatre preparation and instruments. However since intraocular lens implantation for cataract is now advocated everywhere, that first edition has become obsolete. This new edition has descriptions of lens implantation (for both posterior chamber and anterior chamber) written with the same clarity. It even briefly includes the recent adaptation of small incision techniques, but not phacoemulsification as this is unsuitable for remote places. No doubt experienced surgeons would want to do things differently here and there, but less experienced surgeons can be confident that each step as described is safe and tested. There are also extensive chapters on other operations such as for glaucoma and lid problems, but some conditions like squint are understandably omitted. If no teacher is available it might be possible for someone with surgical aptitude to undertake extraocular operations successfully just using the book. But it is certainly not intended to be 'Teach Yourself CataractSurgery'. For intraocular surgery, proper instruction in a structured training programme is essential. This book is a good text book for such training, and for places such as where I work (rural Africa). I do not know of any to rival it. I understand there was difficulty in finding a publisher for this edition. This is regrettable considering all the blindness worldwide which is avoidable by surgery, and we are indebted to those who did undertake publication.

Keith Waddell CBE FRCP FRCOphth

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