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Asian Journal of OPHTHALMOLOGY

Glaucoma Drainage Implants in Asian Eyes

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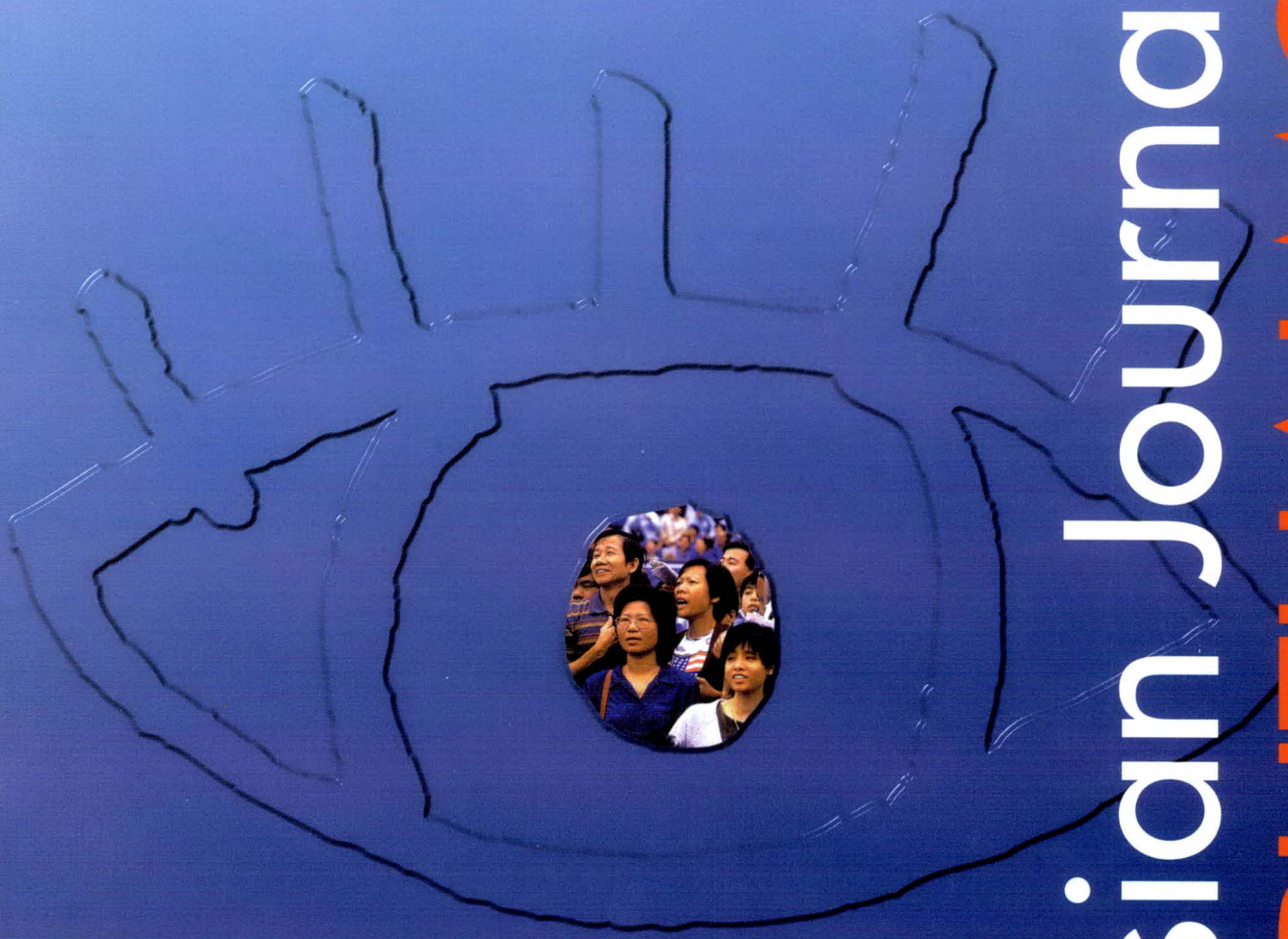
Managing Uveitic Glaucoma

Concepts in Glaucoma

Detection of Glaucoma in the Population

Controlling Mass Blindness in Asia



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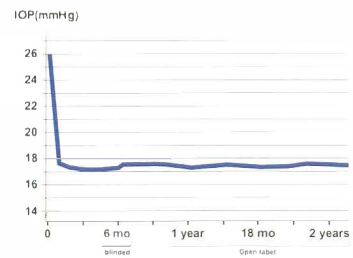

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1. Data on file: Hedman K, Alm A. Presented at the ICO; June 1998; Amsterdam, The Netherlands. 2. Watson PG. Ophthalmology. 1998;105:82-87. 3. Bucci M. J Glaucoma. 1999;8:24-30.
4. Data on file: Emmerich K-H. Graefe's Arch Clin Exp Ophthalmol. Accepted for publication. *Indication: Reduction of intraocular pressure in patients with open-angle glaucoma and ocular hypertension. PX 11294.00

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Asian Journal of OPHTHALMOLOGY is a quarterly publication for the practising ophthalmologist. As new technologies and therapeutic interventions are continually being developed, ophthalmology has become a field of rapid change, particularly in the Asia-Pacific region, where disease patterns and health care delivery differ greatly from that seen in the West. Whilst the focus of Asian Journal of OPHTHALMOLOGY is on glaucoma, other topics relevant to the region will not be ignored. Input from ophthalmologists and allied clinicians is welcomed. This will determine the content and direction of Asian Journal of OPHTHALMOLOGY.

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Management of Glaucoma Associated with Uveitis

This issue of Asian Journal of Ophthalmology focuses on a rare, but no less challenging, form of glaucoma, namely glaucoma associated with uveitis. Although it only represents a small proportion of all glaucomas, complex diagnostic and management decisions are required to treat the condition successfully, especially when intraocular inflammation is coupled with raised intraocular pressure (IOP).[1] When treating these patients, the physician must first diagnose the aetiology of the uveitis and then evaluate the effects of the inflammatory process and the proposed therapy in order to treat the dual pathology successfully.

The article by Dr Justine Smith, *Managing Uveitic Glaucoma,* addresses these issues in a very orderly manner.[2] The difficulty in correctly diagnosing the cause of the uveitis is highlighted and special attention drawn to detailed examination of the anterior and posterior segment signs. These telltale clues will often provide the pathogenesis of the associated increase in IOP. This knowledge is crucial in order to target the specific glaucoma therapy accurately. Information such as the angle anatomy (open or closed) or whether anterior peripheral synechiae or neovascularisation is present will guide the physician to the correct course of action. Laser iridotomy, which is indicated when the IOP rise is due to pupillary seclusion would be inappropriate when the cause of the narrow angle is anterior peripheral synechiae. The choice of medical treatment can also be difficult because steroids, the mainstay of treatment of ocular inflammation, are associated with increased IOP in steroid responders while miotics can exacerbate the underlying inflammation.

As far as surgical options are concerned, the 1- and 2-year cumulative success rates of 81% and 73%, respectively, for trabeculectomy alone in patients with glaucoma associated with uveitis are encouraging, especially without the use of adjunct antimetabolites such as 5-fluorouracil or mitomycin-C.[3,4] Nonetheless, the authors have admitted that there may have been an age bias in their study, whereby more of the younger patients (less than 40 years) underwent Molteno implantation. The 5-year success rate for these patients was 79%. However, although the ethnicities of the patients were not mentioned, one could assume that the majority would be Caucasians and a parallel conclusion cannot be drawn for our Asian patients.

It is well known that drainage surgery in the black population has a higher failure rate than that of Caucasians due to their exaggerated healing response.[5] The article by Aung and Seah highlights the success rates of drainage implants in the Asian population, with successful IOP control in 73.5% of eyes (85.5% if qualified successes were included) which is comparable with Western series.[6] Their series, which incidentally included 7 (of a total of 83) patients with uveitis, confirm that surgery can be successful, even when medical treatment has failed.

I hope that our readers can draw on the experience of these authors for use in their own clinics, wherever they may be in Asia.

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Glaucoma Drainage Implants in Asian Eyes

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Modern microsurgical techniques have increased the success rate of conventional filtration surgery in most patients with glaucoma to 80 to 90%. However, previous studies have suggested that there are racial differences in the outcome of conventional filtration surgery with Asian patients reported to have poorer surgical outcomes than Caucasians.

No studies have examined the outcome of glaucoma drainage implants in Asian eyes. This study was designed to assess the outcome of glaucoma drainage implants in Asian eyes and to determine whether there are racial differences compared with previous reports in Caucasian patients.

Materials and Methods

83 Asian patients (83 eyes) who underwent glaucoma drainage implant surgery at the Singapore National Eye Centre from 1 January 1993 to 31 August 1996 were included in the review. Table 1 shows the racial origins of the patients included in the study. All patients had complicated glaucoma, defined as *"those patients who previously have failed conventional medical, laser, or nonseton surgical treatment, or some combination thereof."* The diagnoses of these patients are shown in table 2.

Table 1. Racial origins of patients receiving glaucoma drainage implant surgery

Chinese	66
Malay	9
Indian	6
Other Asian race	2

Two types of drainage implant were used in the study — 29 Molteno implants and 54 Baerveldt implants. The model was chosen at the discretion of the surgeon in a non-randomised fashion. A single stage procedure was performed and the postoperative management was similar for all patients. The sites for implant fixation included the supertemporal quadrant, superonasal quadrant, inferonasal quadrant, and inferotemporal quadrant. The site was chosen according to factors such as scleral thinning, conjunctival scarring, accessibility of the orbit, presence of peripheral anterior synechiae and depth of the anterior chamber.

Topical tobramycin, prednisolone forte and homatropine were given routinely for the first 6 postoperative weeks. Intraocular pressure (IOP) was measured with a Goldmann applanation tonometer at each visit and antiglaucoma medication was added, as required, to supplement pressure reduction. Outcome was assessed in terms of IOP, visual acuity, and the incidence of complications. The IOP criteria for success were as follows:

- complete success — IOP < 22 mm Hg without medication
- qualified success — IOP < 22 mm Hg with 1 or more medications
- failure — IOP ≥ 22 mm Hg with or without medication.

The follow-up period ranged from 6 to 40 months (mean 13.41 months).

Table 2. Diagnoses of patients receiving glaucoma drainage implants

Diagnosis	Number of eyes
Neovascular glaucoma	35
Post-traumatic glaucoma	12
Post-corneal graft glaucoma	9
Pseudophakic glaucoma	7
Uveitic glaucoma	7
Primary open angle glaucoma (with previously failed trabeculectomy)	4
Post-vitrectomy glaucoma	3
Iridocorneal endothelial syndrome	2
Congenital glaucoma	2
Chronic angle closure glaucoma	2

Results

The mean IOP was reduced from 40.43 ± 9.72 mm Hg (range 18-68 mm Hg) to 14.16 ± 6.29 mm Hg after surgery. 71 patients (85.5%) achieved a final IOP of < 22 mm Hg, of whom 61 patients did not require medication and were classified as a complete success (table 3). The remaining 10 patients who acquired an IOP of < 22 mm Hg with medication were considered to be qualified successes. The remaining 12 patients, including 6 who lost light perception, were classified as failures.

The final best corrected visual acuity improved for 22 patients, remained the same for 49 patients and worsened for 12 patients compared with the preoperative baseline (table 3).

The Baerveldt implant had a better outcome than the Molteno implant in terms of IOP control. There were 45

Table 3. Success rates following glaucoma drainage implant surgery according to intraocular pressure (IOP) reduction and visual acuity

IOP reduction		Visual acuity	
Outcome	Number (%)	Outcome	Number (%)
Complete success	61 (73.5)	Improvement	22 (26.5)
Qualified success	10 (12)	No change	49 (59)
Failure	12 (14.5)	Deterioration	12 (14.5)

Table 4. Success rates for the Baerveldt and Molteno implants

Outcome	Baerveldt implant		Molteno implant	
	250 mm² (n = 30)	350 mm² (n = 24)	Single plate (n = 12)	Double plate (n = 17)
Success	24	21	8	8
Qualified success	2	2	2	4
Failure	4	1	2	5

(83.3%) successes among 54 patients receiving the Baerveldt implant compared with 16 (55.2%) successes among the 29 patients given the Molteno implant (table 4).

There were no intra-operative complications, although postoperative complications occurred in 46 eyes and 20 eyes required surgical revision.

Discussion

Glaucoma drainage implants have gained widespread acceptance for the treatment of severe recalcitrant glaucoma. For many patients they offer the only alternative to cyclodestructive procedures to the ciliary body. The drainage implants used in this study resulted in satisfactory IOP control for the majority of patients with or without additional medication, and the visual acuity outcomes were encouraging.

Clinical failure of drainage implants to adequately control IOP is likely to be due to remodelling of the fibrous capsule with thickening, resulting in loss of permeability, diminished aqueous drainage and failure of satisfactory bleb formation. Failure may also be related to alteration of the position of the implant.

The results of this study compare well with other trials using drainage implants in terms of both IOP control and visual acuity. Importantly, these results were obtained in an Asian population, showing that drainage implants can be successful in this racial group, and were comparable with the success rates achieved in studies of non-Asian patients.

Conclusion

Glaucoma drainage implants are successful in Asian eyes for the treatment of refractory glaucoma. The implants are well tolerated and achieve stable IOP reduction. There is also satisfactory visual stabilisation. *"The role of these implants in Asian eyes for treatment of complicated glaucoma with failed conventional treatment, or for glaucoma unlikely to respond to conventional drainage surgery, indeed is promising."*

Further Reading

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This summary was written by a staff medical reporter.

Global Initiative in Cataract Intervention

From the 17th Congress of the Asia-Pacific Academy of Ophthalmology, Manila, The Philippines, 7-12 March 1999

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Pakistan Institute of Community Ophthalmology
Peshawar
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"*Blindness is a serious physical disability, and is both a cause and an effect of major human frustrations and deprivations*", explained Prof. Khan. At current global estimates, there are nearly 45 million blind people and 135 million suffer from low vision, making approximately 180 million people in the world today who suffer from some kind of visual impairment.

The number of blind people worldwide is increasing by 1 to 2 million annually. It has been suggested that the direct economic burden is US$25 billion and this figure may be 2- to 3-fold if indirect costs are also considered.[1]

The Burden of Cataract

Cataract accounts for approximately 20 million cases of blindness worldwide. Approximately two-thirds of people with cataract blindness live in the Asian subcontinent, China, and subsaharan Africa.[2]

The cataract burden is likely to increase as the global population is not only increasing, but also ageing. Along with this increase in cataract blindness, resources for blindness prevention are decreasing because of the global economic recession and new competing demands for available resources.[1] "*This is especially true for developing countries who are already caught in a vicious cycle of poverty, ignorance and disease*", stated Prof. Khan.

Table 1. Various groups to be involved in the new global sight saving initiative

• Clinical ophthalmologists
• Public health ophthalmologists
• Government organisations
• Non-governmental organisations
• National and international ophthalmic societies
• Blind units

The Global Initiative

In order to consolidate and accelerate efforts against blindness and its socio-economic consequences, a new global initiative has just been launched. It is hoped that this initiative will lead to a comprehensive global eye care programme. Through the well-coordinated efforts of all the groups involved (table 1), this new initiative should encompass all activities related to sight saving, sight restoration, public health education, and rehabilitation of those who are irreversibly blind. The salient features of this new initiative should be integration, coordination, decentralisation, and total quality management.

The eye care programme needs to be planned globally as well as nationally. However, the implementation, monitoring and evaluation should be done at district level, serving a well-defined population (figure 1). The programme should be comprehensive enough to cover all aspects of eye care, with a special focus on cataract.

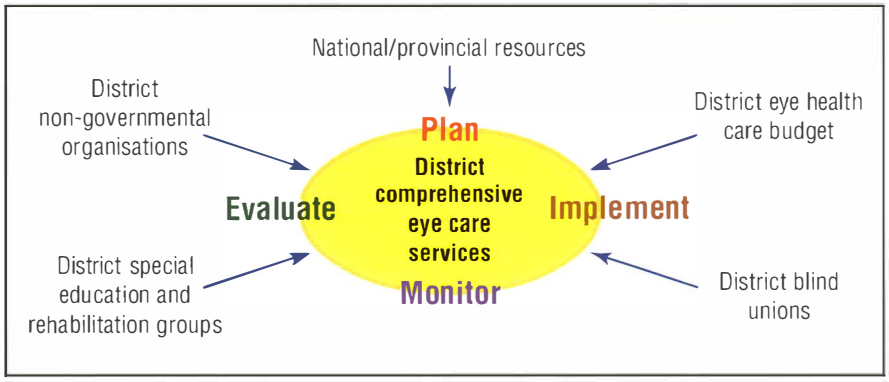
About Susruta

Susruta was a pioneer surgeon in the field of ophthalmology and the originator of cataract surgery in the form of 'couching'. Susruta described the lens as a distinct structure, and differentiated between a mature and immature lens. He classified 76 ocular diseases on a topographical basis. He introduced the concept of 'antisepsis' and the technique of topical anaesthesia through 'mouth vapours'.

Susruta's surgical techniques were passed on to the Greeks, Romans, and Arabs, from whom they were transferred to modern Europe, where they were practised until the middle of the 18th century. Couching remained the operation of choice until Jacques Daviel first performed extracapsular cataract extraction. Cataract surgery then went through several refinements, until phacoemulsification was introduced in the 1960s.

Despite all the advances in cataract surgery during the past 200 years, Susruta's technique continues to be used in many parts of Asia and Africa, and has become 'the poor man's cataract operation'. The operation is said to have a high complication rate, although patients have been able to see through their couched eyes, so it does have some degree of success.

Figure 1. National and district planning of the eye care programme



A global initiative for cataract intervention is justified as 40 to 80% of avoidable blindness is due to cataract. Cataract surgery is as cost-effective as immunisation and is therefore one of the most worthwhile public health interventions.[2] In 1905, DW Greene summed up cataract surgery at the American Academy of Ophthalmology and Otolaryngology; *"No other surgery approaches it in definiteness of conception, delicacy of execution, in the nicety in which different steps are carried out, the object to be attained and lastly, the contentment and joy it has brought to humanity. Other surgeries relieve sufferings, some prolong life and some correct deformity but the extraction of opaque lens does all these and more."*[3]

Provincial Model for the Cataract Initiative

Prof. Khan proposed a model, based in Pakistan, with a 'bottom up' approach for both the comprehensive eye care programme and the cataract initiative. The model focuses on a district in the Northwest Frontier Province (NWFP) in Pakistan with a population of 1 million (tables 2 and 3). The project is a joint venture between the health department of the government of the NWFP, and Sight Saver International in the United Kingdom, and is executed through the Pakistan Institute of Community Ophthalmology, which has recently established a regional resource centre for community eye health.

The first step was to conduct a rapid assessment of the situation to identify the available resources and the current needs, as well as the future resources required for an eye care service with a focus on cataract blindness. The situation analysis revealed that the district ophthalmologist is facing the monumental task of dealing with 25,250 eyes blinded by cataract requiring sight restoration surgery (table 3). This assessment does not include the non-blinding but disabling posterior subcapsular cataract in relatively young and economically productive people with visual acuity better than 6/18, the burden of childhood cataract, and cataract associated with local and systemic diseases, although unilateral cataract is included. Many authors have shown the positive impact of second eye cataract surgery on quality of life, and have therefore recommended that second eye surgery should not be rationed.[4]

The situation analysis identified the major obstacles to an effective eye care programme as being:

- poverty of management
- lack of adequate manpower
- lack of adequate infrastructure
- lack of appropriate equipment
- lack of essential supplies.

General objectives were set so as to improve quality and quantity of care, strengthen the districts by public and private partnership, and to increase coverage among the underprivileged. The specific goals identified include a need to upgrade all district hospitals with infrastructure, equipment, supplies and manpower; development of a sub-district ambulatory cataract surgical unit (as part of the District Initiative for Cataract Intervention) within the primary-secondary eye care complex; enhancement of the utilisation of facilities through appropriate information, education, and communication activities; and completion of 9000 cataract surgeries within 1 year.

The strategic implementation plan includes employment of comprehensive ophthalmologists at district level and 3 specially trained cataract surgeons

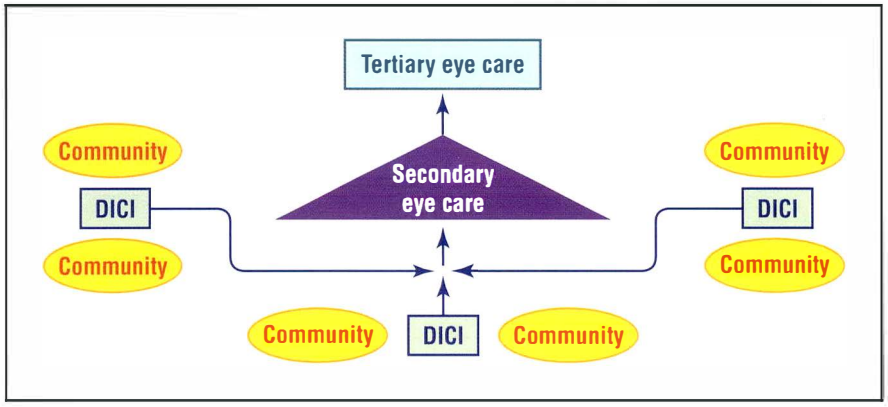
Table 2. Cataract blindness in Pakistan and the Northwest Frontier Province

	Pakistan	Northwest Frontier Province
Blindness prevalence	1.78%	1%
Cataract	66%	70%
Number of ophthalmologists	1500	80
Cataract surgical rate	1050	900

Table 3. District focus on cataract — Northwest Frontier Province

Population	1 million persons
Blindness prevalence	10,000 persons
Prevalence of age-related cataracts	7000 persons
Prevalence of unilateral blindness (2.5%)	25,000 persons
Prevalence of unilateral cataract blindness (45%)	11,250 persons
Total number of eyes blinded by cataract	25,250 eyes
Annual incidence	5050 eyes

Figure 2. Cataract intervention strategy — the 'bottom up' approach.
Abbreviations: DICI = District Initiative for Cataract Intervention



as general duty doctors at subdistrict level, and advancing the outreach programme from the regional eye care centre (figure 2). The intervention strategy will ensure that the district eye care services, including the new cataract initiative, is available, accessible, acceptable, and affordable to all segments of the society, and that it is adjustable and sustainable.

The Pakistan Institute of Community Ophthalmology will ensure technical and managerial support to the district eye care team. The Khyber Institute of Ophthalmic Medical Sciences will offer training in microsurgery to cataract surgeons through a regional microsurgery training centre. This centre has only recently been established and has already retrained 21 district ophthalmologists in cataract and implant surgery. All the retrained surgeons have been supported with operating microscopes and surgical cataract sets.

Community cost sharing, government grants and non-governmental organisation support is ensured for financial sustainability. The district eye care team, as part of the annual optic programme, has been given the ambitious target of performing 9000 cataract sight restoration operations, with a view to decreasing the current incidence of blindness and reducing the backlog.

The performance of the project will be continuously monitored by the Pakistan Institute of Community Ophthalmology and evaluated by external evaluators after 2 years.

Cataract Conclusions: Appeal to End Cataract Blindness

"In order to obtain such global political and professional commitment and the desired resources to combat cataract blindness, let us join in the appeal made by Professor Arthur SM Lim, Secretary-General of the Global Initiative in Cataract Prevention.

- *I appeal for unity.*
- *I appeal to the leaders of government to act.*
- *I appeal for eye surgeons to lead as they are essential.*
- *I appeal to the World Health Organization, non-governmental organisations and leaders of national ophthalmic organisations to open this issue for frank and transparent discussions.*
- *I appeal to the International Council of Ophthalmology to urge national ophthalmic societies and eye doctors to help and to lead.*
- *I appeal to the World Bank, Lions International and Rotary Clubs for financial support.*
- *I appeal to the citizens of Asia to contribute.*
- *I appeal to you to seize the moment."*

Conclusion

It is apparent that the major challenge to eye care workers in the 21st century will be cataract blindness. *"In order to meet this challenge, we have to take a new cataract initiative, which should not only ensure a high quality, affordable and sustainable cataract curative service, but should also revive and accelerate a global research activity for cataract, which should lead to identification of more cataractogenic factors, thereby effecting primary prevention of cataract.[5] The cataract initiative will require political and professional commitment at global and national level, and will also need enormous human and financial resources"* concluded Prof. Khan.

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Managing Uveitic Glaucoma

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Glaucoma is a common and potentially blinding complication of uveitis. The pathogenic processes responsible for an underlying elevation in intraocular pressure are often multiple and may include both open angle and closed angle mechanisms. Successful management of uveitic glaucoma depends on recognition of the uveitis syndrome and clarification of the mechanism(s) contributing to the glaucoma. Both the inflammation and the raised intraocular pressure will require treatment. An anti-inflammatory regimen including corticosteroids, cytotoxic agents and/or specific immunosuppressive agents is chosen according to the type of uveitis, as well as various patient characteristics. When the angle is open, intraocular pressure reduction may be achieved medically using β-adrenergic antagonists, α_2-adrenergic agonists and/or carbonic anhydrase inhibitors. When medical treatment fails, surgical intervention, in the form of a trabeculectomy with wound modulation therapy or drainage implantation, is generally indicated. Laser iridotomy or surgical iridectomy may rapidly normalise intraocular pressure in patients with a closed angle.

Introduction

Uveitic glaucoma is diagnosed when uveitis is associated with an elevated intraocular pressure (IOP), causing glaucomatous field loss and/or glaucomatous field damage. If unrecognised and untreated, this condition may lead rapidly to blindness. Glaucoma may occur in up to 20% of all individuals with uveitis, and it may affect patients of any age group. Although the complication has been observed in every type of uveitis, certain uveitides are more commonly associated with glaucoma.

In Asian populations, common causes include Fuchs' heterochromic uveitis, herpetic eye disease, and the glaucomatocyclitic crisis. Other types of uveitis which may be associated with glaucoma include Behçet's disease, Vogt-Koyanagi-Harada syndrome, and ocular toxoplasmosis. As leprosy, tuberculosis, and syphilis are common in certain parts of Asia, these infectious diseases must also be considered. There are many possible clinical presentations of the uveitis, and consequently, systemic features and investigations may be needed to diagnose these infectious diseases. Interestingly, it is rare for HLA B27-associated uveitis to lead to glaucoma. Lens-induced glaucoma, in patients with hypermature cataract or following lens extraction or trauma, may masquerade as uveitic glaucoma.

Although uveitic glaucoma presents a management challenge for even the specialist ophthalmologist, a thorough clinical examination to identify the specific type of uveitis and the mechanism(s) of the glaucoma will allow the formulation of a rational treatment plan. Furthermore, with the recent introduction of new anti-inflammatory agents and anti-glaucoma medications, as well as advances in glaucoma microsurgery, this condition can often be managed successfully, leaving the patient with useful vision.

Diagnosing Uveitis

A correct diagnosis of uveitis is essential, as this will directly influence anti-inflammatory treatments. Slit-lamp examination findings which may suggest Fuchs' heterochromic uveitis include a white eye with diffusely distributed white round or stellate keratic precipitates. The iris atrophy which produces a very obvious heterochromia in a Caucasian eye may be difficult to appreciate in the Asian eye. It is often visible as a subtle moth-eaten appearance. There are no posterior synechiae, but fragile angle new vessels may be present. Cataract is a common complication, and debris may accumulate in the vitreous.

In herpetic eye disease, corneal sensation may be impaired. There may be iris atrophy, characteristically as small areas with scalloped borders in herpes simplex infection, but as large sectors in herpes zoster ophthalmicus. Active or inactive corneal disease is present in some cases, and old skin scars may suggest herpes zoster infection.

During the glaucomatocyclitic crisis or Posner-Schlossman syndrome, patients complain of halos around lights. The conjunctiva is mildly injected, and there is little anterior chamber reaction with few keratic precipitates and no posterior synechiae. However, IOP elevation may be severe, resulting in corneal oedema.

Behçet's disease, an idiopathic vasculitic condition, causes recurrent anterior and/or posterior uveitis with oral and genital ulceration and a variety of skin lesions. Classically, a transient hypopyon is observed, and retinal vasculitis and the accompanying vitritis are florid.

Vogt-Koyanagi-Harada syndrome is another idiopathic multi-system disorder involving cutaneous and neurological features associated with a panuveitis and characteristic exudative retinal detachments.

Toxoplasmosis presents as a focal necrotising retinitis with vitritis. A whitish lesion with fluffy edges may be associated with a pigmented chorioretinal scar.

Identifying Mechanisms Underlying the Glaucoma

Clearly, in some patients with uveitis, there may be a concurrent primary chronic open angle glaucoma which may be recognised by factors such as history preceding the uveitis or clinical evidence of long-standing optic nerve damage, advanced age, and family history of glaucoma. However, secondary glaucoma is the more common scenario, and both closed angle and open angle types may occur. Often multiple mechanisms may be involved. Gonioscopy is essential to determine underlying mechanisms. As well as identifying an open or closed angle, other structural changes such as peripheral synechiae, a dark muddy appearance of the trabeculum suggesting trabeculitis or neovascularisation may also be noted by such examination.

Angle closure may be reversible if it results from pupillary block due to either 360° posterior synechiae formation or a pupillary membrane, or from forward rotation of a swollen ciliary body. However, peripheral anterior synechiae are frequently permanent. In uveitis, a whole variety of factors including leucocytes, protein, eicosanoids, proteolytic enzymes, cytokines, and oxygen free radicals are released into the aqueous and may therefore act on the open angle to raise IOP either mechanically or by influencing aqueous humour dynamics. In some instances, trabeculitis co-exists with uveitis. Inflammatory mediators may also induce structural changes in the outflow channels which may not be appreciated clinically.

A variety of mechanisms have been reported for glaucoma in Fuchs' heterochromic uveitis, most being open angle in type. Trabeculitis appears to play an important role in herpetic uveitic glaucoma. High IOPs measured during the glaucomatocyclitic crisis result from temporary reduction in outflow facility and increase in aqueous humour production, presumably related to local release of inflammatory mediators. Interestingly, a recent study from Singapore demonstrated a high incidence of subsequent primary chronic open angle glaucoma in patients with Posner-Schlossman syndrome, indicating a need for formal follow-up of these individuals.

A major concern in the management of uveitic glaucoma is the propensity for corticosteroids, the mainstay of uveitis treatment, to elevate IOP to high levels in a significant percentage of patients. Both topical and systemic corticosteroids may have this effect, and although the response normally does not develop until 2 weeks after beginning therapy, it has been reported to occur at any time. The exact mechanism of steroid-induced glaucoma is not known, but hypotheses include an accumulation of glycosaminoglycans in the trabeculum, effects on prostaglandin synthesis which reduce outflow facility, and inhibition of phagocytosis by the trabecular endothelium.

Managing Uveitis

Elevated IOP in uveitis may be reduced simply by controlling the associated intraocular inflammation. Topical corticosteroids are useful for anterior segment inflammations such as herpetic uveitis and Posner-Schlossman syndrome. Fuchs' heterochromic uveitis often requires no anti-inflammatory treatment. For posterior segment disease, systemic immunosuppression may be required, and most commonly this is with oral prednisolone. However, for so-called steroid responders, the choice of anti-inflammatory may be difficult.Often, corticosteroids will be continued in conjunction with anti-glaucoma measures. Controversy surrounds a series of new topical corticosteroids which are reported to be less likely to elevate IOP, whilst still alleviating uveitis, as a result of selective tissue partitioning.

Cyclosporine, a specific immunosuppressive agent, and the cytotoxics such as methotrexate and azathioprine are systemic steroid-sparing drugs. Such treatment is introduced in consultation with a general physician who can monitor for potentially serious systemic side effects.

Some ophthalmologists advocate the use of non-steroidal anti-inflammatory agents. A mydriatic is an important adjunctive measure to prevent permanent posterior synechiae formation. The place of anti-viral drugs in the management of herpetic uveitis is unclear.

Certainly, an early oral course of aciclovir will reduce the risk of uveitis occurring as a complication of herpes zoster ophthalmicus. In herpes simplex uveitis, topical aciclovir is frequently given to treat or avoid concurrent corneal disease.

Managing Glaucoma

When secondary glaucoma is apparent, despite efforts to control the intraocular inflammation, medical and/or surgical

anti-glaucoma therapy will be required. However, an elevated IOP below 30 mm Hg can often be observed, particularly in a young patient with no signs of an associated glaucoma.

Medical Therapies

Usually uveitis with secondary open angle glaucoma is managed medically in the first instance. Sometimes, a combination of several anti-glaucoma drugs from different families may be required to control glaucomatous damage, and this is generally preferable to surgery which carries relatively high risks for this group of patients.

The anti-glaucoma medication of choice is often a topical β-adrenergic antagonist such as timolol or betaxolol. Newer topical options include the carbonic anhydrase inhibitor, dorzolamide, and the α_2-adrenergic agonist, brimonidine. These agents are significantly more expensive than the β-blockers, and are best reserved for patients requiring more than one agent.

Apraclonidine, another topical α_2-adrenergic agonist, is commonly associated with development of tachyphylaxis, but may be a useful temporising agent. In treatment-resistant cases, systemic carbonic anhydrase inhibitors or even hyperosmotic agents may become necessary, although clearly these do not constitute a long-term option.

It is important to avoid medications which may aggravate the inflammation. These include both the cholinergic and the parasympathomimetic miotics. Non-selective adrenergic agonists may contribute to conjunctival hyperaemia and may cause cystoid macular oedema. The recently introduced prostaglandin analogue, latanoprost, may precipitate uveitis in otherwise healthy individuals.

Surgical Interventions

When closed angle glaucoma results from pupillary seclusion, laser iridotomy may be sufficient to adequately re-establish the flow of aqueous out of the eye. In the Asian eye, with its relatively thick, pigmented iris, it is advisable to perform a sequential procedure. An initial treatment with the argon laser is undertaken to cut a tunnel through the iris, and this is followed by a treatment using the Nd-YAG laser to enlarge the tunnel. Unfortunately a laser iridotomy is prone to closure in an eye with active inflammation, and at least 2 iridotomies should be performed in the first instance. If both iridotomies close, a surgical iridectomy will be required.

In some cases, corneal oedema or iridocorneal touch may be indications for a primary surgical procedure. The eye should be as quiet as possible prior to either intervention as aggravation of the inflammation is to be expected following iris manipulation. Clearly, prolonged angle closure will result in formation of peripheral anterior synechiae, and if 75% or more of the angle is closed, neither iridotomy nor iridectomy is likely to be successful.

When medical therapy fails to control pressure-induced optic neuropathy and/or visual field loss, be the angle open or permanently closed, a filtering or shunting surgical procedure may be required. Laser trabeculoplasty generally has no role in the management of uveitic glaucoma. There are few published studies which indicate the outcome of glaucoma surgery specifically in uveitis patients. However, it is generally accepted that an anti-metabolite, either 5-fluorouracil or mitomycin C, will improve the success of trabeculectomy in high-risk individuals. In one of the larger series of 21 uveitic eyes followed for a mean of almost 3 years postoperatively, 70% of cases had controlled IOP after trabeculectomy and 5-fluorouracil. However, a patient with uveitis is at greater risk of subsequent complications such as marked inflammatory reaction, ciliary body oedema causing malignant glaucoma and choroidal effusion.

Various shunting devices are available, such as Molteno, Baerveldt and Krupin. Complications reported in association with these implants include tube failure, ocular hypotony and various complications related to the tube position within the eye, including corneal decompensation, uveitis and cataract.

The Ahmed pump contains an intrinsic valve mechanism which may reduce the risk of hypotony. In one study of 15 eyes, followed for almost 2 years following Ahmed pump implantation, IOP was controlled in 14 eyes, with significant complications in 3 eyes. Cyclodestructive procedures such as cyclophotocoagulation and cyclocryothery may greatly exacerbate intraocular inflammation, and they are used only when other treatments have failed.

Although the success of filtering or drainage surgery is reduced in the presence of active inflammation, this is often just the situation in which surgery is required. Ideally, an eye should be quiet for 3 months prior to surgery. Intensive immunosuppressive therapy is indicated for both emergency and planned procedures. Frequently, a course of oral corticosteroid is prescribed, although for certain relatively low grade anterior segment inflammations such as Fuchs' heterochromic uveitis and Posner-Schlossman syndrome pre-operative topical corticosteroids may suffice. The immunosuppressive regimen

is gradually tapered during the post-operative period, depending on the clinical course.

Summary

Although glaucoma is a serious complication of uveitis, with accurate diagnosis of the uveitis and delineation of the mechanism(s) of the glaucoma, successful treatment is often possible. Recent pharmacological developments have provided a variety of effective anti-glaucoma treatments and, with appropriate immunosuppression, surgery may often succeed. Ultimately, prevention of this condition, the complication of uncontrolled intraocular inflammation, and/or treatment with non-selective corticosteroid, will require the development of highly selective immunosuppressive agents.

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Concepts in Glaucoma

From the 17th Congress of the Asia-Pacific Academy of Ophthalmology "Ophthalmology in the Asia-Pacific Region for the 21st Century", Manila, The Philippines, 7-12 March 1999

Glaucoma Overview

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"This is a very exciting time in glaucoma, because not only do we have new drugs which allow us to provide better treatment, but we also have safer and better laser techniques and greater understanding of the surgical approach. We are also approaching the prevention of glaucomatous blindness in some new and exciting ways", explained Dr Goldberg.

One approach to glaucoma management involves looking at the individual as a whole person. At times, this may mean not initiating treatment for glaucoma, for example when treating an elderly patient with early glaucoma and systemic health problems whose sight is unlikely to be compromised during their lifetime. This concept of 'masterly inactivity' involves close observation for disease progression and liaison with the patient's general practitioner for complete care.

The major strategy is to reduce the intraocular pressure (IOP), although even with a lower IOP, some patients will still experience progressive glaucomatous damage. There is more to glaucoma management than effective IOP reduction.

The role of the blood supply to the optic nerve head in glaucoma is becoming clearer — an unhealthy systemic circulation, involving inappropriate vasospasm or vascular perfusion, has an effect in glaucoma. Patients with vasospasm of the ocular blood vessels may benefit from vasoactive agents.

The concept of optic nerve viability and neuroprotection is now recognised, and research into possible neuroprotective agents continues. In addition, individual susceptibility factors are now known to play a role in the pathogenesis of glaucoma (table 1).

"It is important to treat the patient as a whole and to select the treatment strategies that are appropriate for that patient at that time", concluded Prof. Goldberg.

Table 1. Factors involved in the pathogenesis of glaucoma

Increasing age	
Family history and genetics	
Pressure factors —	secondary glaucoma high tension glaucoma angle closure glaucoma
Susceptibility factors —	vascular disease vasospasm hypotension weakness of the lamina cribrosa watershed zones of the blood supply to the choroid and optic nerve head

Concepts of Glaucoma

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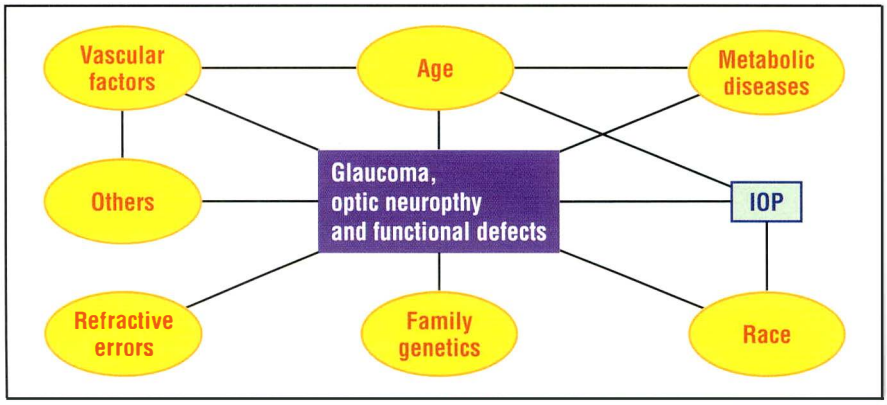
Glaucoma is not a new disease, having been known for more than a century, a time when almost all patients presented with symptoms caused by angle closure glaucoma because of the lack of routine investigations. Elevated IOP in tandem with glaucoma was considered to be the extent of the disease.

More recently, however, optic disc morphology by ophthalmoscopy, visual field examination and gonioscopy have increased the understanding of the angle configuration and early classification of glaucoma. In 1959, Haik defined glaucoma as *"... a disease in which the intraocular pressure is elevated to a degree that the eye cannot tolerate without damage to its structures ... the intraocular pressure varies from individual to individual, as well as at different*

Figure 1. **Risk factors for glaucoma and their relationship with each other.**



times in the same individual .... Furthermore, susceptibility to pressure also varies. Glaucomatous damage may therefore occur in eyes in which the pressure appears to be well within the so-called 'normal' range."

Dispelling the Glaucoma Myths

It is clear that eyes with normal IOP do develop glaucoma (so called normal tension glaucoma). In addition, increased IOP does not always cause glaucoma, as in ocular hypertension; only 35% of patients with ocular hypertension go on to develop glaucoma. Successful lowering of IOP in glaucomatous eyes does not necessarily stop progression of the disease and the relationship of IOP to disease progression is statistically weak. These and other findings suggest that there must be other risk factors, either causal or contributory.

Analysis of several studies have shown that 57% of patients experience visual field progression despite IOP reduction, although increased IOP is still an important risk factor in glaucoma which is both causative and dose-related. However, there is no helpful cut-off for 'normal' or 'abnormal' IOP. Other risk factors for glaucoma include:

- vasospasm — 48% of patients with normal tension glaucoma have migraines
- ocular blood flow ± impaired autoregulation
- systemic haemodynamic problems — cardiac disease, atherosclerosis, anaemia, hyperviscosity, nocturnal dip
- microvascular diseases — diabetes.

Figure 1 shows the risk factors for glaucoma and their inter-relationships.

Conclusion

"We should now start to look at glaucoma in a new way, with the realisation that it is a multifactorial disease with multiple risk factors, of which pressure, while important, is but one", said Dr Rojanapongpun. Labels such as normal tension glaucoma may need to be disregarded as these will highlight the pressure factor, limiting the desire to look for other factors that may play an important role in the health of the optic nerve.

Cutting Edge in Glaucoma

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"The overriding priority in glaucoma is still earlier diagnosis, along with prevention of visual loss and blindness, maintaining quality of life, and improving standards of care", explained Prof. Chew.

Advances in glaucoma research (table 2) will lead to new possibilities in the field of apoptosis and neuroprotection, disc imaging with better diagnostic possibilities, therapeutics, better IOP lowering and increased perfusion, and modulation of wound healing.

Advancements on the Horizon

Apoptosis results in cell body loss without glial cell replacement. Early diagnosis of glaucoma depends on the detection of the course of apoptosis, possibly through the early detection of damaged magnocellular cells.

Newer modalities for the detection of early glaucoma include frequency doubling threshold perimetry and blue-on-yellow static threshold perimetry. Advancements in computerisation allow for more rapid calculations to be made intra-test (SITA).[1] In the field of digital optic disc imaging, scanning lasers, birefringence polarimetry, and digitisation are emerging.

Therapeutic modalities are now decreasingly invasive, with the use of laser therapy, measures to increase outflow and decrease aqueous production, and photodynamic therapies. The direction for future treatment modalities involves more efficient IOP lowering measures with fewer side effects, agents to increase optic nerve head perfusion, calcium channel blocking agents to block apoptosis, and upregulation of survival gene factors for neuroprotection.

Gene therapy is a breaking field in glaucoma. During the past 6 years, the loci of 3 autosomally dominant genes

Table 2. **Areas for research that will provide improvements in glaucoma care**

• Cell and molecular biology
• Molecular genetics
• Computer hardware and software application
• Advances in laser technology
• Pharmaceutical advances

Standards of Diagnosis

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The 'gold standard' parameters in the diagnosis and treatment of glaucoma remain IOP, visual field changes, and optic nerve damage. In clinical practice, the diagnosis of glaucoma is facilitated by addressing the clinical history, clinical signs and ocular findings, and equally important is the monitoring of any changes in these parameters (table 3).

Various modern optic nerve head imaging will give a good assessment of the progress of the disease — retinal nerve fibre layer imaging is also a useful qualitative assessment. Other useful ophthalmic investigations include standard and blue yellow visual field perimetry, ultrasound biomicroscopy, contrast sensitivity, electrophysiological tests, ocular blood flow measurement, diurnal IOP measurements, and genetic mapping.

A recent analysis of the changing definitions of glaucoma found that the main criteria used to define glaucoma in clinical research were IOP, optic nerve and visual field.[1] These researchers concluded that, during the 1990s, more specific descriptions of optic disc/visual field changes have been used to define glaucoma than in earlier decades, when more qualitative statements were used to describe glaucoma.

This finding has led ophthalmologists to question whether there may be a need to have some consensus for more specific criteria in glaucoma definition for glaucoma research.

Table 3. 'LEMA' diagnosis of glaucoma

- **L**isten (history)
- **E**xamination (ocular and systemic)
- **M**onitoring (clinical progress)
- **A**nalysis (weigh all available data)

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(GLC1A, GLC1B, GLC1C) involved in juvenile and adult primary open angle glaucoma (POAG) have been identified. This understanding of the increased ability of genetic factors to produce glaucomatous patterns of disease in families is crucial to the future diagnosis of glaucoma.

Filtration surgery outcomes have been improved with antimetabolites, and the next generation of surgical adjuncts is likely to be antibodies (e.g. anti-TGFB2). Improved wound healing modulation and better tube designs are also expected.

In Summary

In the next century, it is anticipated that ophthalmologists will be able to detect glaucoma earlier, identify who is most at risk, follow the progress more effectively, and increase the patients' ease and acceptance of treatment. Intervention will be less invasive, with improved laser procedures, eyes will be better protected against worsening vision, and all procedures will be safer, concluded Prof. Chew.

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Medical Therapy in the Future

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"The goals of glaucoma treatment are to preserve visual function and provide the best achievable quality of life", stated Dr Rahman. The current glaucoma drugs are all ocular hypotensive agents as it used to be thought that elevated IOP was synonymous with glaucoma. However, it is now known that approximately one-sixth of all patients with POAG have a 'normal' IOP of less than 20 mm Hg.

The concept of vascular abnormality in glaucoma has come from research that demonstrates a vasospastic tendency in patients with POAG, particularly those with normal IOP levels. Therefore, the treatment of glaucoma solely through IOP reduction may not correct abnormalities in ocular blood flow. Drugs that increase retinal and optic nerve perfusion may be the glaucoma treatment of the future.

Current Antiglaucoma Agents

β-Blockers are the most commonly prescribed initial monotherapy, mainly because of the efficacy and tolerability of these agents. However, β-blockers do have both ocular and systemic side effects.

Topical carbonic anhydrase inhibitors are effective ocular hypotensive agents

that work well in combination with other agents. Cholinergic agents include the first ever drug given for POAG, pilocarpine. It is still prescribed today as an additive treatment, although it is not well tolerated.

Prostaglandin is the most potent ocular hypotensive drug currently in use. Latanoprost is able to reduce IOP by increasing outflow rather than reducing aqueous production. It is thought to be the safest of all IOP lowering drugs in terms of side effects as it is rapidly metabolised and eliminated, and it does not penetrate the blood-brain barrier.

The Future

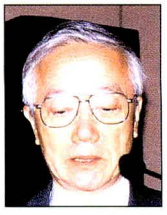
Although the association between ocular blood flow and glaucoma have been demonstrated, there is, as yet, little research into potentially useful drugs. Drugs that will improve blood flow need to be cardiovascular in nature. To be effective, these agents will need to be delivered to the back of the eye, however, if they are delivered systemically, there is a likelihood of systemic cardiovascular side effects. Currently available ocular hypotensive agents that appear to increase ocular blood flow include latanoprost, topical dorzolamide and β-blockers.

Conclusion

"The quest for an ideal glaucoma drug which will reduce IOP, improve ocular blood flow and protect the optic nerve will continue", concluded Dr Rahman.

Detection of Glaucoma in the Population

From 'Breakfast with the Experts', 9 March 1999, at the 17th Congress of the Asia-Pacific Academy of Ophthalmology "Ophthalmology in the Asia-Pacific Region for the 21st Century", Manila, The Philippines, 7-12 March 1999



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Evaluation of clinical parameters other than pressure is crucial for detecting glaucoma. In the Nationwide Glaucoma Survey in Japan, glaucoma or ocular hypertension was detected in 289 (3.56%) of 8126 adults using applanation tonometry and colour fundus photography.[1] Interestingly, normal tension glaucoma (NTG) was 3.5-fold more prevalent than primary open angle glaucoma (POAG). POAG and NTG were differentiated solely by an intraocular pressure (IOP) level of 20 mm Hg, meaning that if screening had been performed by tonometry alone, more than 60% of glaucomas in this study would have remained undetected. Many researchers have found a similar prevalence of NTG compared with POAG (table 1).

As tonometry is no longer considered to be a reliable method for detection of glaucoma, changes in structure and function of the eye must be determined. The structures affected in glaucoma and subject to clinical examination are the optic disc and the retinal nerve fibre layer.

The Optic Disc in Glaucoma

The patterns of glaucomatous optic disc atrophy may be summarised as focal atrophy, concentric atrophy (generalised expansion of the cup), deepening of the cup, or pallor/cup discrepancy, depending on the axonal loss in the optic nerve. In some eyes, one pattern predominates, while in others, 2 or more patterns may be recognised.

Optic disc haemorrhages characteristic of glaucoma are small and lie near the edge of the disc. Typically, they appear as splinter haemorrhages. It has been estimated that they occur in at least

Table 1. Prevalence of normal tension glaucoma relative to primary open angle glaucoma

Investigators	Total POAG	Total with normal IOP	Percentage
Armaly 1992[2]	189	129	68.3
Bankes 1968[3]	45	3	6.7
Bengtsson 1981[4]	33	16	48.5
Hollows 1966[5]	20	7	35
Klein 1992[6]	104	33	31.7
Leibowitz 1980[7]	40	21	52.5
Mason 1989[8]	147	53	36.1
Shiose 1991[1]	151	99	65.6
Sommer 1990[9]	194	114	58.8

Abbreviations: POAG = primary open angle glaucoma; IOP = intraocular pressure.

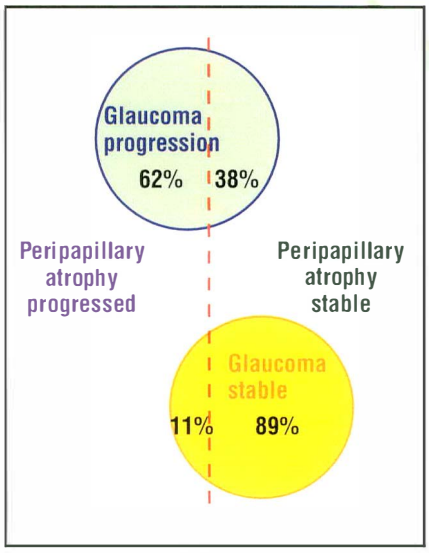
one-third of all patients with glaucoma at some time in the course of the disease and they tend to occur in the vicinity of the retinal nerve fibre layer defect.[10]

Prof. Kitazawa suggested that *"disc haemorrhage is a sign of an active process at the optic disc; this may lead to development of retinal nerve fiber layer defect over time and therefore should be regarded as an indicator of early and possibly progressive glaucomatous damage in normal-tension glaucoma."*

Peripapillary atrophy is present in non-glaucomatous eyes. However, there is evidence that it is more distinct in glaucoma. Uchida *et al.* have demonstrated that enlargement of peripapillary atrophy is closely associated with progression of glaucomatous disc and field changes in POAG (figure 1).[11]

Evaluation of the optic disc is heavily influenced by subjective factors on the part of the examiner. "*Between the discs with easily recognisable advanced changes and those completely free from glaucomatous change, there is a range of optic disc appearances within which opinions differ as to whether or not there is any glaucomatous change. It is in this range that there is scope for diagnostic improvement*", explained Prof. Kitazawa.

Figure 1. Association of peripapillary atrophy and glaucoma progression.



Visual Function in Glaucoma

The ultimate goal in the management of glaucoma is preservation of visual function. Although visual function can be measured in many ways, perimetry is the most important method. Perimetry may be used for screening purposes in the out-patient clinic, however, the cost-benefit ratio does not advocate its routine indiscriminate application. Perimetry should therefore be reserved for subjects who are suspected to have glaucomatous damage. For patients with suspected glaucoma, it is preferable to use a perimetric method that is as sensitive as possible because the detection of visual field defects may have serious consequences for patients. Unfortunately, perimetry is a time-consuming test, making it difficult for elderly patients to tolerate, but new programmes (Fastpac, SITA[12]) for perimetry should reduce the test time.

Frequency doubling perimetry identifies the preferential loss of M cells in early glaucoma. There is evidence that frequency doubling perimetry detects early glaucomatous functional loss that cannot be detected by conventional alternated perimetry. However, longitudinal observation is required to substantiate the findings. "*If this is proved to be the case, frequency doubling perimetry will undoubtedly be a valuable asset to our diagnostic armamentarium for glaucoma*", concluded Prof. Kitazawa.

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WORLDEYES — Controlling Mass Blindness in Asia

In an era of rapid economic development and technological breakthroughs, basic health care is easily forgotten. The advances in technology and the benefits of modern ophthalmology are yet to reach a large proportion of the estimated 180 million people worldwide who are visually disabled — depriving them of the right to normal vision.

The result is that for nearly 40 to 45 million of these less fortunate people, there is no difference between a radio and a television. More than half of the world's blind people live in Asia, where operating microscopes, lasers, intraocular implants and vitrectomy still reach less than 5% of the population.

During the past 50 years the entire pattern of blindness has changed. The causes of mass blindness have shifted from infection and malnutrition to cataract, glaucoma, and retinal diseases. While most international organisations share the same dedication towards helping people with eye disease, they often have their own objectives and special interests, and there may sometimes be disagreement about the best approach.

A group of ophthalmologists based in Singapore has recognised the importance of the role of ophthalmologists in preventing blindness due to cataract. It has become clear that blindness from infection and malnutrition is under control, while blindness from other eye diseases is on the increase, and requires the care of qualified ophthalmologists. Against this scenario the World Cataract Eye Surgeons Society (WORLDCATS) was formed. WORLDCATS, mooted at the Singapore National Eye Centre's first international meeting in 1993, was registered on 3 June 1994.

WORLDCATS was proposed as an international movement of ophthalmologists dedicated to the control of mass cataract blindness in developing countries, particularly in Asia. The society was founded by Professor Arthur SM Lim, who has worked towards the elimination of the most common cause of curable blindness — cataract blindness. In 1998, WORLDCATS changed its name to WORLDEYES, and the organisation now works with other causes of blindness as well as cataract.

An interview with ...

Professor Arthur SM Lim
Founder President of WORLDEYES
Singapore National Eye Centre
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Q: *WORLDEYES has grown into an international movement in the prevention of blindness. How did it all start?*

Prof. Lim: The term 'prevention of blindness' should be changed to 'ophthalmic care and reconstruction of the eye' because the whole pattern of blindness has changed. 50 years ago, eye diseases caused by infection (onchocerciasis, trachoma and corneal ulcers) and malnutrition (keratomalacia) or optic atrophy were the primary causes of blindness. Today cataract, glaucoma, and retinal disease, particularly diabetic retinopathy, are the major causes of blindness.

All of these diseases require treatment from ophthalmologists. Yet most of the international organisations involved in this field are manned by public health workers, nutritionists and infectious disease specialists, while the ophthalmologists are less involved. In my opinion, the blindness rate will continue to increase, possibly doubling every 10 years, and without the involvement of ophthalmologists, outdated cataract operations and glaucoma treatments will continue.[1]

Unfortunately, there is some friction between the ophthalmologists in Asia and non-governmental organisations (NGOs), as the ophthalmologists are concerned about outdated treatments, while the NGOs find it difficult to modernise treatments without the collaboration of the ophthalmologists. It was for this reason that an international organisation of ophthalmologists was formed in 1993.

WORLDCATS was proposed as an international movement of eye surgeons dedicated to the control of mass cataract blindness in developing countries. The ophthalmologists contributed their time to help the less privileged by working to prevent blindness and restore sight.

Q: Why did WORLDCATS change its name to WORLDEYES?

Prof. Lim: WORLDCATS started as an international movement of eye surgeons dedicated to the control of mass cataract blindness. However, along with the objective of controlling cataract blindness, WORLDCATS recognised the need to control other causes of blindness such as glaucoma and diabetic retinopathy, as well as treating other conditions such as severe trauma to the eye and corneal disease requiring transplantation. Our activities have stimulated the interest of ophthalmologists around the world. Today, WORLDEYES has more than 1000 supporters in 94 countries and the number is constantly increasing.

Q: What are the main objectives of WORLDEYES?

Prof. Lim: A major problem in the control of mass cataract blindness in Asia is the lack of eye surgeons — in some countries there are simply not enough. When we started WORLDCATS, we were convinced that our approach needed to be different from that of most organisations, i.e. going to a place and performing eye surgery. We decided that the best approach is to teach modern eye surgery to local ophthalmologists.

Teaching good quality eye surgery to colleagues in less developed countries will ultimately restore vision to more blind people than simply going to a country to perform surgery. The basis of our approach is based on this well known saying — *"If you operate on one man, you restore vision to one man, but if you teach your colleagues how to perform low cost cataract surgery, they will solve the problem of cataract blindness in the world."*

In line with this approach, the objectives of WORLDEYES are as follows:

- To perform one million cataract surgeries with implants during the next 10 years by the united efforts of 2000 volunteer eye surgeons.
- To promote training and skills transfer in surgical expertise in developing countries.
- To promote quality assurance in eye surgery worldwide.

Q: Are the supporters of WORLDEYES all ophthalmologists?

Prof. Lim: Almost all of our supporters are ophthalmologists, although there are a few who are not eye surgeons but are interested in the work that we are doing. WORLDEYES has tremendous potential as the society provides an opportunity for eye surgeons to contribute towards the control of mass blindness by volunteering their time and skills.

Q: Which countries are the focus for WORLDEYES?

Prof. Lim: Currently, our focus is in Asia, and China in particular. We need to consolidate our efforts in Asia to begin with. As we grow and increase our international membership, we will look to other areas where blindness is a continuing problem.

Q: How do you approach achieving your objectives?

Prof. Lim: The goal is to complete 500 cataract operations in 5 years for each volunteer ophthalmologist and their team. In the process, local eye surgeons will also be trained. Training of eye surgeons entails upgrading their standards and skills, demonstrating that results can be obtained without the need of expensive equipment. The concept when going to an area is to demonstrate a technique. The equipment used for surgery should be affordable, therefore, it is important that equipment that is already available in the country is used. The purpose of the committee is to ensure that the relevant approaches to disease management are taught.

We have built 5 centres in China for training eye surgeons and are looking at building centres in other countries. These centres have received strong support from the local governments.

The International Intraocular Implant Training Centre in Tianjin has performed more than 50,000 implant surgeries, while another 70,000 implants have been performed by the 16 hospitals affiliated to it. The centre has trained more than 2000 eye surgeons throughout China.

The Xiamen Eye Centre, completed at a cost of S$57 million, was officially opened in November 1997. The centre is intended to be the premier eye centre in China. The world cataract Intraocular Lens Implant Training Centre situated in Jinan has performed almost 10,000 implant surgeries since its inception in 1996.

Q: What happens to the local eye surgeons once they are trained?

Prof. Lim: The objectives for the centres are to train Chinese ophthalmologists in implant surgery with an emphasis on high-quality and low-cost techniques, and to work with and supervise ophthalmologists in the regional hospitals who are responsible for treating the thousands of patients with visual impairment. The trainees at these centres come from all over China and perform extended implant surgery in their own localities. Some have set up training facilities in

their areas to extend the skills they have acquired to their colleagues. It is hoped that the world will adopt the Tianjin centre as the model to solve the problem of mass cataract blindness.

Q: *What are your plans for helping other countries in Asia?*

Prof. Lim: Countries or organisations requiring assistance from WORLDEYES are invited to communicate their needs to the WORLDEYES Secretariat. WORLDEYES plans to expand its activities to other countries in the future. For example, India has a huge population and a massive problem with blindness.

Q: *How do you fund the projects?*

Prof. Lim: Ophthalmologists contribute their time and skills for free. WORLDEYES also appeals for the participation of nurses, administrators, and paramedical staff. Manufacturers of microscopes, intraocular lens implants and instrument corporations as well as service clubs are also welcome to help the project. The funds for organisation, equipment, and infrastructure come from international foundations and voluntary organisations, and corporate and individual donors committed to the cause of alleviating mass blindness.

Q: *How do you see the future for WORLDEYES?*

Prof. Lim: A major problem in the control of mass blindness is the lack of eye surgeons. Blindness is a massive global problem that can only be solved through the combined efforts of NGOs and eye surgeons. Various international organisations have tackled the non-surgical causes of blindness related to improving primary health care and using intracapsular extraction without implants.

WORLDEYES intends to complement the work of these organisations. WORLDEYES has large pool of eye surgeons who are committed and dedicated to the cause of combating mass blindness. The services of this large pool of eye surgeons can be tapped for the benefit of those less privileged. Being an Asian initiative has given an additional stimulus and impetus for Asian ophthalmologists to respond.

WORLDEYES is not just another international organisation. It is about a willingness to help the less fortunate, providing an opportunity for eye surgeons to utilise their skills and contribute their time for the benefit of those less fortunate than they are.

The misery of millions of people with cataract blindness continues to increase in the poorest areas of the world at a time when medical advances make low-cost restoration of normal vision possible. United, we can hope that the millions of victims with vision impaired by eye disease will be able to look into the 21st century and see.

Reference

1. Lim ASM (Ed). The human right to normal vision? Singapore; World Scientific Publishing Co. Pte Ltd., 1997.

For further information please contact:

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11 Third Hospital Avenue
Singapore 168751
Tel: (65) 227 7255
Fax: (65) 227 7291

CONGRESS CALENDAR

NOVEMBER

2-5
Inter-American Course in Clinical Ophthalmology
Miami, FL, USA
Contact: Bascom Palmer Eye Institute
Tel: (1 305) 326 6110
Fax: (1 305) 326 6474

14-19
Annual Scientific Meeting of the Royal Australian College of Ophthalmologists
Melbourne, Victoria, Australia
Contact: Dr M McCombe, East Melbourne Eye Group, 126 Victoria Parade, East Melbourne, VIC 3002, Australia

DECEMBER

3-4
Peri–Ocular Region and the Eye
Toronto, Ontario, Canada
Contact: Audrea Martin
Tel: (1 416) 978 2719
Fax: (1 416) 971 2200

4-5
Hong Kong Ophthalmological Symposium 1999
Hong Kong, China
Contact: The Secretariat, Room 802, 8th Floor, Hong Kong Academy of Medicine Building, 99 Wong Chuk Hang Road, Hong Kong, China
Tel: (852) 2761 9128
Fax: (852) 2715 0089

FEBRUARY 2000

11-13
Diabetes and the Eye 2000: an International Symposium
Cabo San Lucas, Mexico
Contact: UCIMC-Memorial/UCI Center for Health Education
Fax: (1 562) 933 0101

APRIL 2000

16-20
The 4th International Ocular Trauma Conference (IV-IOTC)
Zhengzhou, China
Contact: Dr Wang Wenzhan, Department of Ophthalmology, First Teaching Hospital, Zhengzhou 450 052, China
Tel: (86 371) 699 3497
Fax: (86 371) 696 4217

29-5 May
The Association for Research in Vision and Ophthalmology (ARVO) Annual Meeting
Fort Lauderdale, FL, USA
Contact: ARVO, 9650 Rockville Pike, Bethseda, MD 20814-3998, USA
Tel: (1 301) 571 1844
Fax: (1 301) 571 8311

MAY 2000

20-24
Annual Meeting of the American Society of Cataract and Refractive Surgery
Boston, MA, USA
Contact: American Society of Cataract and Refractive Surgery
Tel: (1 703) 5912220
Fax: (1 703) 591 0614

AUGUST 2000

9-11
Ophthalmology 2000. Eye Health in the Clinic and in the Community
Melbourne, Victoria, Australia
Contact: Conference Co-ordinator, Ophthalmology 2000, Centre for Eye Research Australia, Locked Bag 8, East Melbourne, Victoria 8002, Australia
Tel: (61 3) 9929 8360
Fax: (61 3) 9662 3859

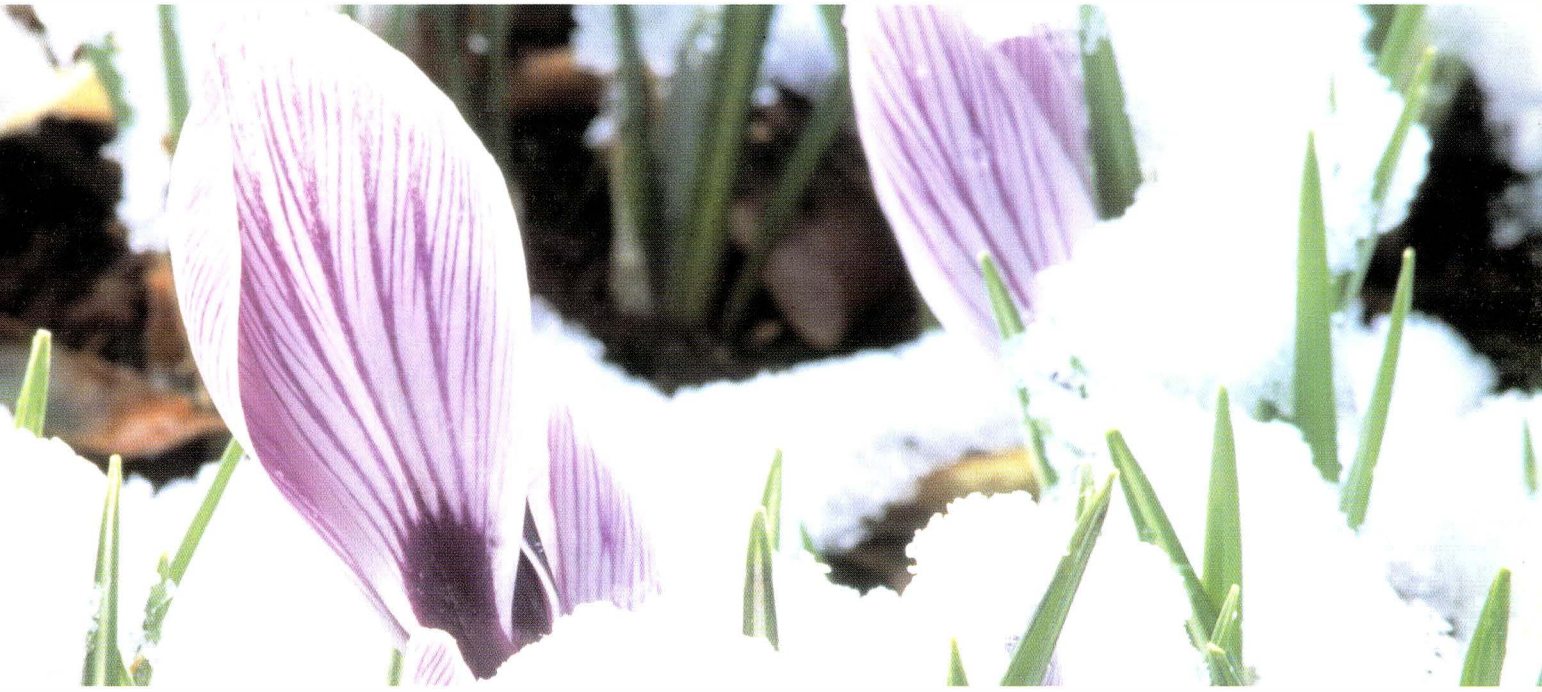
NOVEMBER 2000

12-16
American Academy of Ophthalmology, Annual Meeting
Dallas, TX, USA
Contact: American Academy of Ophthalmology, 655 Beach Street, PO Box 7424, San Francisco, CA 94120-7424, USA
Tel: (1 415) 561 8500

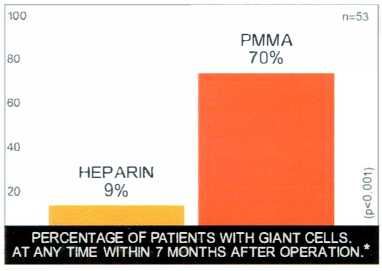
DECEMBER 2000

2-4
4th Singapore National Eye Centre International Meeting & 3rd World Eye Surgeons Society International Meeting
Singapore
Contact: The Secretariat, 4th SNEC International Meeting & 3rd WORLDEYES International Meeting, Singapore National Eye Centre, 11 Third Hospital Avenue, Singapore 168 751
Tel: (65) 227 7251
Fax: (65) 227 7290

From a patient's perspective, PMMA never looked better.



The beauty of CeeOn Lenses from a patient's perspective.



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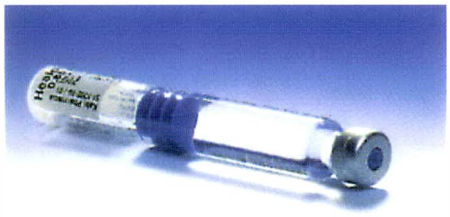
* Philipson B, Fagerholm P, Calel B, Grunge-Lowenrud A. The three-year results of a randomized double-blind study on heparin surface modified IOL versus an unmodified IOL. Paper presented at the *11th Congress of the European Society of Cataract and Refractive Surgeons (ESCRS) September 1993, Innsbruck, Austria.*

Twenty-seven million eyes and no surprises.



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