

The Challenge of Glaucoma

A bewildering array of medical technology and scientific advances awaits us in the 21st century. Although we have made significant inroads into cataract and diabetic retinopathy, glaucoma remains an enigma.

Of these major blinding conditions, especially in developing countries, cataract blindness will be resolved in 20 years. Implant surgery restores normal vision to the patient while the problem remains that of organisation. For a model, we should refer to the International Intraocular Implant Training Centre in Tianjin, China, where 2250 eye surgeons have been trained and normal vision has been restored to 120,000 blind cataract patients with low-cost extracapsular cataract extraction and lens implantation.¹ This centre has paved the way for the establishment of similar centres around the developing world.

As far as diabetic retinopathy is concerned, ophthalmologists have the grave responsibility of making sure that blindness is controlled in the early stages with screening, especially since early treatment with laser photocoagulation is known to prevent blindness in 90% of carefully treated patients.² With effective organisation, most patients with diabetic retinopathy will not suffer severe visual loss or blindness.



In contrast, despite decades of research and debate, most problems associated with open angle glaucoma require further clarification. We do not fully understand the condition; the epidemiology is confusing. Even its definition eludes us. For these reasons, glaucoma will emerge as the most challenging discipline of the 21st century.

We are fortunately more knowledgeable about angle closure glaucoma. The condition is mechanical and is based on the anatomical occlusion of a normal but narrow filtrating angle by the iris and, depending on the extent and rapidity of the occlusion, it can present clinically as acute, sub-acute, or chronic angle closure glaucoma. It has been known for many years that angle closure glaucoma is more common in Asians, whereas amongst Caucasians, open angle glaucoma is more common. More specifically, this epidemiological pattern is found mainly in Chinese populations, but not in other Asians.

Why is angle closure glaucoma more common among Chinese people? Does it result from intrinsic differences between Chinese and Caucasians? What is the impact of these differences on clinical practice?

No one is certain why angle closure glaucoma is more common in Chinese people, but evidence suggests that it is due to the anatomical structure of the eye; a smaller eye with a shallow anterior chamber and a narrow filtrating angle. Dim lighting or reading will dilate the pupil and increase the pupillary block and iris bombe, causing closure of the narrow filtrating angle, which can trigger off acute angle closure glaucoma. In addition, acute glaucoma is more severe in Chinese populations and frequently requires trabeculectomy to control the increased pressure.^{3,4} The effectiveness of laser in angle closure glaucoma is different for Caucasians and Chinese. It has been known for some time that YAG laser is effective for the thin blue iris of Caucasians, but is far less effective in the thick brown iris of Chinese eyes, for whom a combination of Argon laser with the YAG appears to be the most effective approach.

An important use of laser is to apply contraction laser burns at the iris periphery, a procedure known as iridoplasty. The brown iris can be made to contract by use of Argon laser with power of approximately 500 mW, diameter of 250 micron and time of 0.50 seconds. These contractions of the iris are of particular value in acute angle closure glaucoma — the iris is pulled away from the angle which opens up the angle, and the high intraocular pressure from acute glaucoma can be rapidly and effectively lowered. Laser is especially valuable in situations where medication has failed to reduce the pressure; for example, in acute glaucoma. Iridoplasty, unfortunately, is not without complications. In addition, its effectiveness is usually temporary and many eyes will still require a peripheral iridotomy, trabeculectomy, or cataract surgery. In spite of the complications, iridoplasty will be more commonly used worldwide as it is an effective procedure in the treatment of angle closure glaucoma.⁵

The racial difference makes it likely that screening of elderly Chinese women for angle closure glaucoma will become important as it is cost-effective to screen this select group.⁶ When progression of angle closure glaucoma is slow and the raised pressure insidious, chronic angle closure glaucoma presents as open angle glaucoma, and clinically, they are indistinguishable except with gonioscopy. It is therefore essential to remember, especially for Chinese patients, that all patients diagnosed with chronic open angle glaucoma should have their angles evaluated.

During the past decades, our knowledge about open angle glaucoma has not significantly advanced. Today, we are not even certain of the desired level of intraocular pressure for glaucoma patients. At one stage, it was 22 mm Hg, although some have argued that each eye with glaucoma has a different desirable pressure, while in some countries, especially Japan, where normal pressure glaucoma is common, there are indications that high pressure is not the only risk factor in glaucoma.

Numerous research papers have been presented on visual field studies using different computer programmes. Disadvantages of these tests are that they are all subjective (dependent on the patient's response), and that a firm decision on the progress of the field defect cannot not be made until tests have been repeated several times.



In addition, there are conflicting views on the observations of the optic disc cup. When is it pathological and how should it be recorded? It is clear that the stereo disc record is important and should be performed for all patients with glaucoma. However, the more expensive, complex laser imaging and similar techniques of recording the optic disc cup are not cost-effective; at the present moment, they are used mainly for research purposes. Yet, because open angle glaucoma will become increasingly important, we can only hope that more effective equipment for a precise measurement of the optic disc cup will become cheaper.

Pathology in open angle glaucoma, the changes in the trabecular meshwork, and the reasons why the optic disc becomes damaged — and whether this is due to a defective vascular supply or some other factors — remain uncertain despite years of molecular biology studies and millions of dollars spent on glaucoma research. More recently, genetics and interference with genes have offered the possibility of more significant advances.

Numerous new eye drops are being introduced every few months; some have become popular partly because they can lower intraocular pressure more effectively and hopefully, prevent blindness. They are marketed by profit-making organisations although this is not unusual in a free market economy where companies aggressively promote their products.

While we appreciate these advances, careful studies should be done on the cost-effectiveness of the eye drops, as well as their real long-term value to patients with glaucoma throughout the world. The prostaglandin latanoprost appears to be more effective in its pressure-lowering effect, although recent studies suggest that medication which protects the optic nerve disc from damage may be the answer for open angle glaucoma.⁷

Trabeculectomy, touted as a great advance, fails because of scarring in many cases. Although 5-fluorouracil and mitomycin-C can delay scarring, their positive effects are counterbalanced by possible complications from defective wound healing as well as infection (endophthalmitis can rapidly blind the eye).⁷ When is it justified to operate on 1-eyed patients? After all, chronic glaucoma takes years to blind the typical patient, sometimes even beyond his lifespan, whereas it takes only a few days to inflict blindness with surgery. This explains why several eminent international experts in glaucoma have publicly stated that patients can be worse off following surgery.

Indeed, experienced clinicians are important in the management of complex glaucoma and should balance the enthusiasm for short-term procedures and technology with the considerations for long-term management. As Epstein has stated, *"The fields of glaucoma are littered with relics of short-term enthusiasms for certain procedures and techniques."*⁸

Of all the fascinating challenges we will confront in the 21st century, glaucoma promises to be the most intriguing. Young

ophthalmologists eager to face the challenges of ophthalmology in the new millennium, will find themselves drawn to the study, management, and surgery of glaucoma. As glaucoma is not only the affliction of individuals, but also a leading cause of world blindness, they will find themselves embarking on an exciting and profitable odyssey of global significance.

1. Lim ASM. Eye surgeons – seize the opportunity. *Am J Ophthalmol* 1996;**122**:571-573.
2. Blankenship GW. Fifteen-year argon laser and xenon photocoagulation results of Bascom Palmer Eye Institute's patients participating in the diabetic retinopathy study. *Ophthalmology* 1991;**98**:125-128.
3. Lowe RF, Lim ASM. Clinical pathology. In Primary Angle Closure Glaucoma. Singapore: PG publishing, 1989:20.
4. Lim ASM. Primary angle closure glaucoma in Singapore. *Aust J Ophthalmol* 1979;**7**:23-30.
5. Lim ASM, Tan A, Chew P, *et al.* Laser iridoplasty in the treatment of severe acute angle closure glaucoma. *Int Ophthalmol* 1993;**17**:33-36.
6. Seah S, Foster PJ, Chew PTK, *et al.* Incidence of acute primary angle-closure glaucoma in Singapore. *Arch Ophthalmol* 1997;**115**: 1436-1440.
7. Aung T, Wong HT, Chee CY, *et al.* Comparison of the intraocular pressure-lowering effect of latanoprost and timolol in patients with chronic angle closure glaucoma. A randomised double-masked study. Annual Meeting of the Association for Research in Vision and Ophthalmology (ARVO), May 9-14, 1999, Florida, USA.
8. Epstein DL. Introduction. In Epstein DL, Allingham RR, Schuman JS (eds), Chandler and Grant's *Glaucoma*. 4th ed. Baltimore: Williams & Wilkins, 1997:3.

ASM Lim
Singapore



Millennium Year — the 'Year of Ophthalmology'

This is your chance to raise the profile of Ophthalmology in Asia. As we enter the new millennium, let's take the opportunity to discuss new ideas, publish new research, and disseminate the latest information in ophthalmology through the pages of Asian Journal of OPHTHALMOLOGY. In other words, let's make the Millennium Year the 'Year of Ophthalmology'.

Please send your articles and comments to:

| | |
|--|---|
| The Editor Asian Journal of OPHTHALMOLOGY Scientific Communications (Hong Kong) Ltd 4/F, 11 Queen Victoria Street Central Hong Kong | Tel: (852) 2868 9171 Fax: (852) 2868 9269 E-mail: editor@scientific-com.com |
|--|---|