


**Cataract Surgery Using the Nylon Loop Technique**

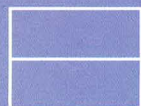
**Eye Manifestations in Patients with Acquired Immunodeficiency Syndrome**

**Ethylenediaminetetraacetic Acid Chelation for Calcific Band Keratopathy**

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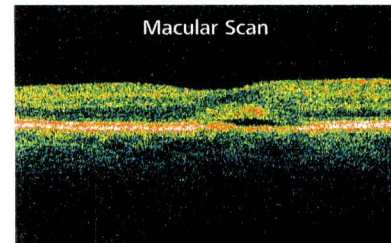
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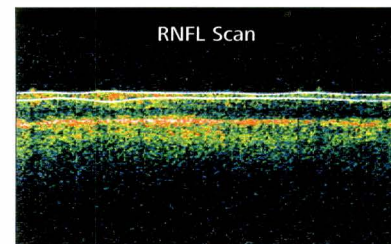
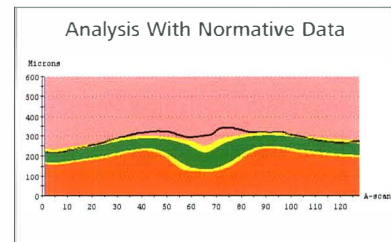
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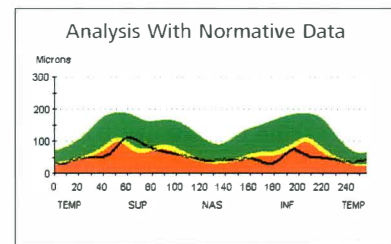
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# Manual Small Incision Cataract Surgery

Brian Little

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During the past 18 years, a plethora of innovative techniques have been developed for performing sutureless manual small incision cataract surgery (MSICS). This steady surge of ingenuity has been inspired mainly by the need to develop affordable but also comparable alternatives to phacoemulsification for use in non-industrialised developing countries. So how affordable and how comparable are they?

The cost of MSICS in India has been recently and accurately priced at US\$15.68 per procedure. This was a few cents cheaper than extracapsular cataract extraction (ECCE) at US\$15.82. The price incorporated a fixed facility charge of US\$11.34 common to both procedures which, when subtracted from the total, computes the cost of consumables to be less than US\$5.00 per procedure, and this included the intraocular lens (IOL).<sup>1</sup> In Nepal, the cost of consumables for MSICS was found to be US\$10.00, which is still very affordable.<sup>2</sup>

However, the role of phacoemulsification is limited in developing countries, not only by its high cost but also by the fact that the learning curve is a relatively long and steep one. In addition, a large proportion of the cataracts are mature and very dense. So even if phacoemulsification could compete on price at approximately US\$15.00 per procedure it would still by no means be the most appropriate choice of technique for dealing effectively with the large surfeit of cataract blindness worldwide. This challenge can only be met by using appropriate techniques that can achieve high volume and high quality and can be performed in community eye centres at an affordable cost.<sup>3</sup> This is borne out in practice by the experience of the Lahan Eye Hospital in Nepal where phacoemulsification and MSICS are both available. Up to April this year, 40,000 MSICS and 4,000 (scleral tunnel) phacoemulsification procedures had been performed at this hospital. The reason for this 10:1 ratio is not the cost but the suitability of the MSICS technique for the density of cataracts that make up the bulk of the workload. (David Yorston, personal communication).

At US\$15.68 per procedure, the issue of affordable cost has now been put to rest. Addressing the issue of volume, Hennig et al

recently demonstrated that the average time taken to perform sutureless MSICS was a very impressive 4 minutes in a prospective study of 500 consecutive procedures performed by an experienced surgeon.<sup>2</sup>

So now we come to the thorny issues of efficacy and safety or, more practically, visual outcomes and complications, which are the principal clinical criteria by which we must evaluate any new technique. Until relatively recently there has been very little reliable data on which to base such an evaluation. This is now no longer the case and, in general, the comparisons are very favourable.

Firstly, a randomised controlled trial comparing MSICS with ECCE found that both were comparably safe and effective but that MSICS yielded better uncorrected vision.<sup>4</sup> More recently, the same author conducted a masked randomised controlled trial to compare the safety and efficacy of phacoemulsification with MSICS.<sup>5</sup> The principle findings were that the proportion of patients with unaided vision of  $\geq 6/18$  was higher in the phacoemulsification group (81%) than the MSICS group (71%). However, the proportion with best-corrected vision of  $\geq 6/18$  at 6 weeks was identical at 98.4% and, surprisingly, the difference in astigmatism between the 2 groups was not statistically significant.

Concerning the issue of complications, the comparison of MSICS with phacoemulsification was once again favourable. Although the rate of posterior capsule tear was greater in the MSICS group (6%) than the phacoemulsification group (3.5%) this was probably related to the use of a can-opener capsulotomy technique in the MSICS group and did not result in any increase in poor outcome. Otherwise, there were no significant differences, although no equipment was available with which to measure endothelial cell counts. Hyphaema from tunnel haemorrhage is always a concern when using scleral incisions but, unexpectedly, this was not reported in this study. With MSICS it has been found to occur at a rate of 9.4%.<sup>2</sup>

Finally, some comments about the MSICS technique. It is worthwhile to note that the generic description of MSICS covers a variety of techniques that can conceal some potentially important differences.

Firstly the incision — the term 'small' in MSICS is relative to ECCE and compares an average of 7 mm with approximately

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13 mm. Most MSICS methods express a preference for using a funnelled sclerocorneal tunnel incision because it can remain self-sealing and sutureless at the sizes required and it also generates less astigmatism than a more anterior incision of the same size. If the nucleus is removed whole then an external scleral incision of 6 to 8 mm is needed, depending upon the estimated size of the nucleus. If the nucleus is mechanically fragmented, then the incision still needs to be 5 to 6 mm wide, which may not be a significant benefit for the potential risks of nuclear fragmentation unless the nucleus is particularly large and otherwise difficult to remove. The creation of an accurately constructed scleral tunnel is without doubt the most difficult part of MSICS and takes time to learn.

Continuous curvilinear capsulorhexis is a more secure technique than a can-opener or linear capsulotomy and is well worth the effort of learning for MSICS. However, for a mature cataract the rhexis needs to be 6 to 7 mm in diameter for the nucleus to be readily and safely dislocated into the anterior chamber. This requires a very well-dilated pupil which will not always be available. Trypan blue, if affordable, is an invaluable help in the absence of an adequate red reflex.

The removal of the nucleus from the eye can be achieved with or without the use of instruments. If the nucleus fits comfortably through the incision then it can be either hydro-expressed using balanced salt solution injected through a cannula or delivered through an anterior chamber maintainer, or it can be visco-expressed using a dispersive (in preference to cohesive) visco-elastic. Larger nuclei often need to be pulled out. Although many surgeons use an irrigating Vectis for this, the cheaper alternative

of a 30-gauge needle bent into a fish hook described by Hennig et al<sup>2</sup> is strikingly effective for removing large hard nuclei.

From a broad-brush perspective, the various techniques for MSICS are founded on the same basic principles and there is no clear overall winner. The true winners are the hundreds of thousands of patients in developing countries who have benefited from this affordable, safe, and effective surgical innovation that, in the hands of experienced surgeons, compares so favourably with the gold standard of phacoemulsification.

The King is dead, long live the King? Not quite, perhaps, but there is now a young and maybe serious contender for the crown that has all the right qualities and is a lot cheaper to maintain.

*Asian J Ophthalmol. 2006;8:133-4*

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# Small Incision Extracapsular Cataract Surgery Using the Nylon Loop Technique

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**Aim:** To evaluate the results of small incision cataract surgery with intraocular lens implantation using the nylon loop technique.

**Methods:** 105 patients underwent small incision cataract surgery using the nylon loop technique between October 2004 and September 2005. The postoperative best-corrected visual acuity and intraoperative and postoperative complications were evaluated. The patients were examined 1 day, 1 week, 1 month, and 3 months after surgery and thereafter every 3 months.

**Results:** The mean follow-up was 29.2 weeks (range, 28 to 54 weeks). Postoperatively, best-corrected visual acuity of 20/40 or better was achieved in 95 eyes (90.5%) after 1 week. The most frequent intraoperative complication was iris prolapse ( $n = 11$ ). One posterior capsule break without vitreous loss occurred during implantation of the intraocular lens and a posterior chamber intraocular lens was implanted in the sulcus. The most important postoperative complication was transient corneal oedema, which developed in 8 eyes (7.6%). No corneal decompensation occurred in any patient.

**Conclusion:** Small incision cataract extraction using the nylon loop technique resulted in a low incidence of complications, good visual recovery, and no need for phacoemulsification.

**Key words:** Cataract extraction, Intraoperative complications, Lens implantation, intraocular, Nylon loop technique, Postoperative complications, Visual acuity

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## Introduction

Several techniques for manual small incision cataract surgery (MSICS) have emerged as practical alternatives to phacoemulsification, especially in developing countries.<sup>1-10</sup> The materials are cheap and readily available anywhere in the world and the techniques achieve rapid postoperative visual recovery with minimal surgery-related complications. The nylon loop technique is a modification of the wire snare technique introduced by Keener.<sup>11</sup> The nucleus is divided into 2 halves with a nylon loop and each half is removed with 2 Sinsky hooks. The purpose of this study was to evaluate visual acuity and complications in eyes undergoing SICS using the nylon loop technique.

## Methods

### Patients

This prospective study was conducted at the Department of Ophthalmology, Prapokklao Hospital, Chantaburi, Thailand. 105

consecutive patients with uncomplicated aged-related cataract underwent MSICS using the nylon loop technique from October 2004 to September 2005. Patients with coexisting glaucoma, uveitis, subluxated lens, traumatic cataract, or posterior segment pathology were excluded from the study.

All patients had a complete preoperative ophthalmological examination that included a slit-lamp examination with pupil dilatation, tonometry, and ophthalmoscopy. Written informed consent was obtained from all patients enrolled in the study.

### Surgical Technique

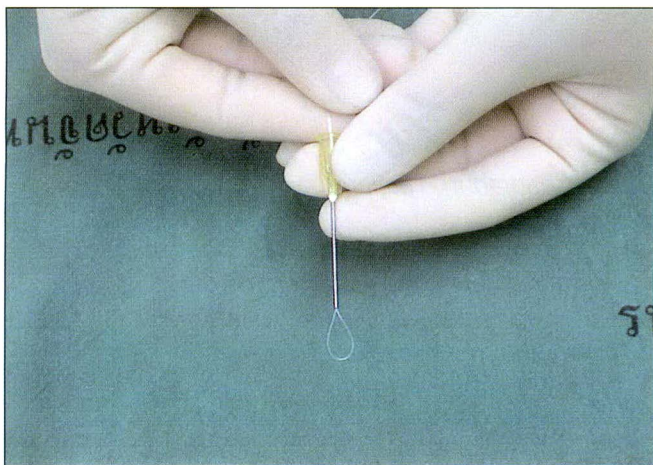
A nylon loop instrument is simple and cheap to make. The instrument can be made from a 20-gauge disposable needle and 0.25-mm diameter fisherman's nylon or 4/0 nylon suture. The sharp tip is cut from the needle and any sharp edges are smoothly rounded using sandpaper. The blunt needle is then threaded with a strand of 0.25-mm diameter fisherman's nylon or 4/0 nylon suture. Thus, the loop end, which has 2 strands, is threaded through to the other end of the needle (Figure 1).

Retrolubar or peribulbar block anaesthesia was given and topical anaesthesia was required for some patients. All operations

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## Cataract Surgery Using the Nylon Loop Technique

**Figure 1.** The nylon loop made from a 20-gauge disposable needle and 0.25-mm fisherman's nylon.



were performed by the same surgeon, who was experienced in MSICS.

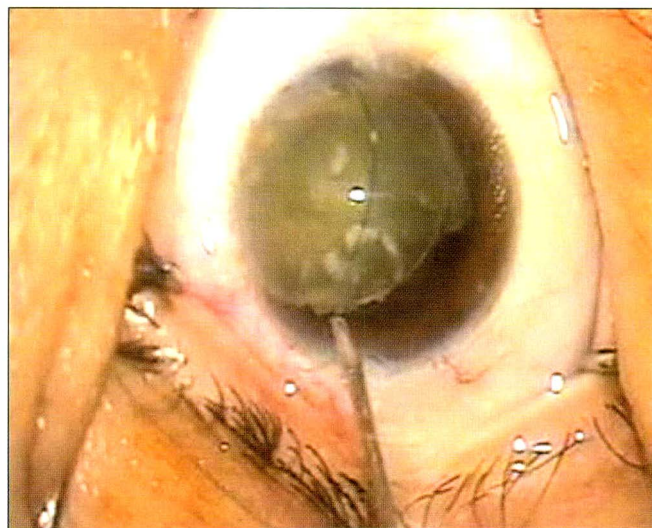
A paracentesis incision at the 2 o'clock position in the left eye or the 7 o'clock position in the right eye was performed with a 15° stab knife, followed by a temporal clear corneal incision using a 3.0-mm keratome. If the anterior chamber maintainer (ACM) was used for capsulorhexis or cortex aspiration, another paracentesis was performed at the nasal site for insertion of the ACM.

Viscoelastic was used to maintain the anterior chamber. A large continuous curvilinear capsulorhexis was performed with a bent 27-gauge needle with a minimum size of 6 to 7 mm in diameter. If the capsulotomy size was too small to accommodate a large nucleus, a relaxing cut was made. Hydrodissection of the capsular bag from the lens cortex was performed using a 27-gauge anterior chamber canula and balanced salt solution (BSS). Hydrodelineation of the nucleus was performed until the golden ring shape was observed under the operating microscope.

Anterior cortical debris were removed using a standard Simcoe canula. The viscoelastic was injected into the anterior chamber to protect the corneal endothelium. The nucleus was prolapsed into the anterior chamber using 2 Sinsky hooks. The nylon loop was inserted through the temporal clear corneal wound and gently passed under the nucleus core. The loop was inserted horizontally and then gradually turned until it swept over the edge of the nucleus with the help of the lens manipulator or the Sinsky hook. The loop was placed vertically and brought across the nucleus (Figure 2). The 20-gauge disposable needle was supported and the nylon outside the canula was smoothly removed. The nucleus was then split into 2 fragments.

The viscoelastic was injected into the anterior chamber again. The corneal incision was then enlarged to 5 to 6 mm with a 3.0-mm disposable keratome. Two Sinsky hooks were introduced

**Figure 2.** The nylon loop was placed vertically in the middle part of the lens.



to separate the fragments and to align the first fragment to the incision. A Sinsky hook was placed at the distal part of the first fragment, the other hook was pressed against the sclera near the corneal wound and then removed through the wound (Figure 3). The second fragment was removed using the same technique (Figure 4).

The anterior chamber then was rinsed to remove epinuclear fragments through the corneal incision using a flat 14-gauge anterior chamber canula. The residual cortex was aspirated using a standard Simcoe canula.

A 5.5-mm polymethyl methacrylate posterior chamber intraocular lens (IOL) was implanted in the capsular bag. Either a viscoelastic substance or BSS was used to maintain the anterior chamber. The incision was closed with one 10-0 nylon suture and the viscoelastic was removed via the Simcoe canula.

**Figure 3.** The first fragment was removed through the corneal wound using 2 Sinsky hooks.

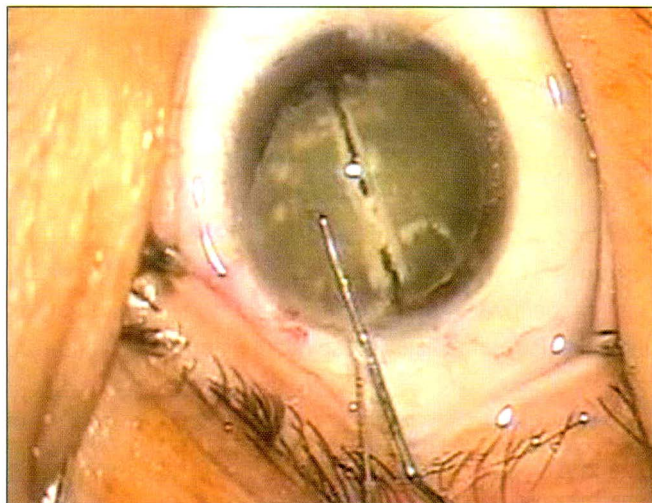
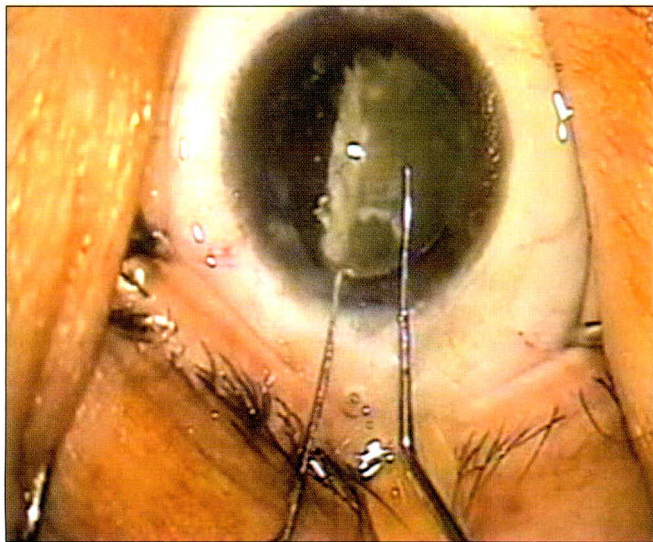


Figure 4. The second fragment was removed through the corneal wound using 2 Sinsky hooks.



### Postoperative Treatment

Postoperative treatment included neomycin 0.35%–dexamethasone 0.1% eye drops 4 times daily for 1 month. The patients were examined 1 day, 1 week, 1 month, and 3 months after surgery and thereafter every 3 months. The data collection included postoperative visual acuity, and intraoperative and postoperative complications. The primary visual outcome was Snellen visual acuity with pinhole correction. The complications of the surgery were clinically evident events that occurred during the operation and during the postoperative follow-up period.

### Results

This technique was performed in 105 consecutive patients and 102 patients were examined after at least 5 follow-up visits (mean, 29.2 weeks; range, 28 to 54 weeks). There were 41 men and 64 women aged from 56 to 88 years.

The preoperative best-corrected visual acuity (BCVA) is shown in Table 1. The visual acuity was <15/200 in 66 eyes (62.9%) and between 20/200 and 20/70 in 39 eyes (37.1%). The postoperative BCVA was 20/40 or better in 95 eyes (90.5%), 95 eyes (90.5%), 94 eyes (89.5%), and 92 eyes (87.6%) at 1 week, 1 month, 3 months and the last follow-up visit, respectively (Table 2).

Intraoperatively, the most common complication was iris prolapse, which occurred in 11 eyes (10.5%). Descemet's membrane detachment was observed in 3 eyes (2.9%) and was limited to the area close to the wound. During the capsulorhexis, 2 eyes required conversion to can-opener capsulotomy. Posterior capsule rupture occurred during the IOL implantation in 1 eye and a posterior chamber IOL was implanted in the sulcus. There were no serious complications during the surgery.

Table 1. Preoperative visual acuity (n = 105).

Visual acuity	Number of eyes (%)
20/70-20/50	7 (6.7)
20/100-20/200	32 (30.5)
15/200-3/200	31 (29.5)
2/200–hand movement	35 (33.3)

Postoperatively, local corneal oedema close to the incision site occurred in 8 eyes (7.6%); this resolved within 3 days in 6 eyes and within 7 days in 2 eyes. Other postoperative complications were hyphaema in 1 eye, iris depigmentation in 12 eyes, and posterior capsule opacity in 4 eyes. No corneal decompensation occurred in any patients.

### Discussion

As with all MSICS, the aim of the nylon loop technique is to reduce the size of any cataractous lens intraocularly so that it can be manipulated and extracted through a relatively small incision. The procedure should offer rapid visual recovery, good postoperative visual acuity, and a low incidence of complications.

In this series, a BCVA of 20/40 or better was achieved in 95 eyes (90.5%) at the end of the first postoperative week. This shows that visual recovery with the nylon loop technique is rapid.

The most common intraoperative complication was iris prolapse, which was seen in 11 eyes (10.5%). Iris prolapse occurred due to premature entry to the wound, and improper nuclear removal through the corneal wound. Progression along the learning curve could result in a lower incidence of iris prolapse.

The nylon loop technique resulted in a lower rate of postoperative transient corneal oedema (7.6%) than multiphaco-fragmentation (10.0%),<sup>5</sup> the sandwich technique (38.0%),<sup>12</sup> and phacotrisection (54.0%).<sup>13</sup> These techniques are performed mostly in the anterior chamber, so corneal endothelial damage may occur during nuclear luxation or during nuclear removal through the clear corneal incision. This damage can be avoided if viscoelastic is frequently injected into the anterior chamber to protect the endothelium. In addition, progression along the learning curve can lower the incidence of endothelial-related complications. To ensure satisfactory postoperative visual acuity without complications, the following recommendations are made:

- during the nuclear fragmentation step, the 2 fragments may be of unequal size and the larger fragment may be difficult to remove through the corneal wound — the wound may need to be enlarged to aid nuclear removal
- nuclear removal through the corneal wound can be performed using 2 Sinsky hooks or fine-toothed forceps to reduce the incidence of corneal endothelial damage and postoperative corneal oedema

# Cataract Surgery Using the Nylon Loop Technique

Table 2. Postoperative visual acuity (n = 105).

Visual acuity	Follow-up visit			
	1 week Number of eyes (%)	1 month Number of eyes (%)	3 months Number of eyes (%)	Last visit Number of eyes (%)
20/20	26 (24.8)	34 (32.4)	34 (32.4)	30 (28.6)
20/30 – 20/40	69 (65.7)	61 (58.1)	60 (57.1)	62 (59.0)
20/50 – 20/70	9 (8.6)	9 (8.6)	7 (6.7)	9 (8.6)
20/100-20/200	1 (0.9)	1 (0.9)	1 (0.9)	1 (0.9)

- although the nylon loop technique enables cataract surgery for both soft and hard nuclei, this technique is recommended to ophthalmologists new to cataract surgery for cataracts of grade NII to NIIL nuclear hardness<sup>14</sup> because this method is easy to perform.

The nylon loop technique of manual nuclear fragmentation is safe and achieves good postoperative results without the use of expensive phacoemulsification equipment. This technique is especially practical in developing countries.

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# Ocular Manifestations and Human Immunodeficiency Virus Retinopathy in Patients with Acquired Immunodeficiency Syndrome in North India

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**Aim:** To evaluate the spectrum of eye diseases in patients with human immunodeficiency virus, with special reference to human immunodeficiency virus retinopathy and its risk factors.

**Methods:** All patient with human immunodeficiency virus attending the Infectious Disease Clinic at Sir Sunderlal Hospital, Institute of Medical Sciences, Banaras Hindu University, India, between January 2001 and December 2003 were enrolled. All patients underwent a thorough eye examination. Patients with acquired immunodeficiency syndrome retinopathy were analysed separately for predisposing factors. The risk factors analysed were positive C-reactive protein, low CD4 levels, associated central nervous system infections, and other eye diseases. Statistical analysis was done using Medcalc version 7.5.

**Results:** Of 460 analysable patients, 88 patients (19%) had some eye manifestations, and 54 patients had human immunodeficiency virus retinopathy. Univariate analysis disclosed that immunosuppression (CD4 levels, <200/ $\mu$ L), positive C-reactive protein, associated eye lesions, and any central nervous system pathology were significant risk factors for the development of human immunodeficiency virus/acquired immunodeficiency syndrome retinopathy.

**Conclusions:** Human immunodeficiency virus could be a risk factor for retinopathy as a significant number of patients did not have any other findings or risk factors for the development of retinopathy. However, it would be premature to draw definitive conclusions about the risk factors, as the number of patients analysed was small.

**Key words:** CD4-positive T-lymphocytes, Eye manifestations, HIV infections, India

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## Introduction

Ocular manifestations in acquired immunodeficiency syndrome (AIDS) are varied and affect almost all the structures in the eye. The lifetime cumulative risk of at least one abnormal ocular lesion in patients with human immunodeficiency virus (HIV) ranges from 52% to 100%.<sup>1-6</sup> The first published data in India focusing on ocular manifestations in patients with HIV was from Sankara Nethralaya in 1995.<sup>4</sup> However, there is no information on eye manifestations associated with HIV from eastern Uttar Pradesh and Bihar, the 2

most populous states in India. This study provides preliminary data on eye manifestations associated with HIV in this area and is one of the largest studies focusing on HIV retinopathy conducted to date in India. The results of this study were compared with those of other Indian studies and data from other countries.

## Methods

### Patients

All patients with HIV attending the Infectious Disease Clinic, Sir Sunderlal Hospital, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India, were enrolled in the study. Sir Sunderlal Hospital is a 1000-bed tertiary care teaching hospital with a catchment area of 5 states (Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand, and Chattisgarh). The annual number of new patients

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# Eye Manifestations in Patients with Acquired Immunodeficiency Syndrome

**Table 1. Baseline characteristics of patients with human immunodeficiency virus.**

Characteristics	Patients with retinopathy (n = 54)	Patients without retinopathy (n = 108)
Age (SD) [years]	35.2 (12.6)	36.9 (13.6)
Male:female ratio	3.6:1	3.8:1
Duration of symptoms (SD) [months]	11.6 (1.9)	11.7 (2.2)
Time from diagnosis (SD) [months]	4.57 (0.74)	5.03 (0.59)
Patients receiving highly active antiretroviral therapy (%)	96	92

with HIV is approximately 150. Patients with HIV retinopathy were included as the study population. The control patients had HIV but did not have HIV retinopathy and were matched for age, sex, and duration of AIDS symptoms. The baseline characteristics of the study population and controls are shown in Table 1. Informed consent was provided by all patients prior to investigation. Patients were excluded from the study if they did not consent to enrollment, or if they had coexistent diabetes or hypertension, as the manifestations of HIV retinopathy and diabetic/hypertensive retinopathy overlap.

## Design

The presumed risk factors included were positive C-reactive protein (CRP), low CD4 levels (<200/ $\mu$ L), associated central nervous system (CNS) infections, and other eye diseases.

HIV status was confirmed by antibody testing using enzyme-linked immunosorbent assay with 2 different antigens. CD4 count was performed by using fluorescent assisted cell sorter count (Becton Dickson, Singapore) as per the protocol given by the manufacturer. Ophthalmological examination included naked eye examination, visual acuity, indirect and direct ophthalmoscopy, and slit-lamp examination.

All the associated diseases were identified exclusively on the basis of clinical examination by their classical appearance. If patients had associated CNS lesions, the type of lesion was assessed by imaging, cerebrospinal fluid evaluation, culture, and serology.

## Statistical Analysis

Analysis was done using Medcalc version 7.5. It was hypothesised that immunosuppression as evidenced by low CD4 level, active inflammation represented by positive CRP, associated CNS lesions, and eye diseases were independent risk factors for HIV retinopathy. The odds ratio for developing HIV retinopathy was calculated from matched pairs. Univariate analysis was done by means of McNemar's chi squared test. Conditional logistic regression was used for the analysis of presumed risk factors.

## Results

Of 460 patients enrolled in the study, there were more men than women, with a ratio of 3.7:1. There was no sex difference in the incidence of eye diseases. The mean age of the patients was

**Table 2. Ocular manifestations in patients with human immunodeficiency virus.**

Manifestation	Number of patients (%)*
Cytomegalovirus retinitis	1 (1.1)
Molluscum contagiosum of the eyelid	6 (6.8)
Conjunctivitis	12 (13.6)
Papilloedema	26 (29.4)
Blepharitis	34 (38.7)
Human immunodeficiency virus retinopathy	54 (61.4)
Impaired visual acuity (<6/24 uncorrected)	66 (75.0)

\* Percent calculated from the total number of eye manifestations.

37.6 years (range, 2 to 60 years). The CD4 count was available for 375 patients. Eighty eight patients (19%) had some ophthalmological manifestations and 54 patients had HIV retinopathy. The various ophthalmological findings are shown in Table 2.

Among the patients with HIV retinopathy, 23 had CNS diseases — tubercular meningitis (8), cryptococcal meningitis (6), CNS toxoplasmosis (4), progressive multifocal leukoencephalopathy (2), and HIV encephalopathy (3) — 19 patients had other eye manifestations — molluscum contagiosum of the eyelid (6), blepharitis (10), and conjunctivitis (3) — and the remaining 12 patients had other diseases — pulmonary tuberculosis (8), *Pneumocystis carinii* pneumonia (3), and disseminated multi-dermatomal herpes (1). The mean blood pressure and blood sugar of patients with or without HIV retinopathy were tested because patients with hypertension or diabetes might have findings similar to HIV retinopathy, but these were not significantly different.

Univariate analysis showed that immunosuppression (CD4 level, <200/ $\mu$ L), positive CRP, other associated eye lesions, and any CNS pathology, were significant risk factors for retinopathy. The analysis is shown in Table 3. However, when dichotomised CD4 levels, positive CRP, and other associated eye diseases were simultaneously analysed in conjunction with sex and age as potential confounding factors in a conditional logistic regression model, CD4 levels and CRP lost their significance, while associated diseases of CNS lesions or other ophthalmological diseases maintained their significance.

## Discussion

The spectrum of ocular lesions in patients with HIV from this region of India is different to that from other regions in India<sup>5</sup> and other parts of the world<sup>7-9</sup> (Table 4).

Table 3. Univariate and multivariate analysis of risk factors for human immunodeficiency virus retinopathy.

Variable	Univariate analysis			Multivariate analysis		
	Odds ratio	95% Confidence interval	p Value	Odds ratio	95% Confidence interval	p Value
CD4*	7.2	2.0-24.8	0.000	2.0	0.5-10.3	0.43
C-reactive protein	3.8	1.6-9.3	0.001	1.2	0.4-6.9	0.78
Tubercular meningitis	3.7	1.8-12.3	0.05	4.7	0.9-22.0	0.07
Cryptococcal meningitis	16.9	2.4-141.0	0.001	30.0	2.9-318.0	0.001
Toxoplasmosis	4.9	0.6-6.8	0.07	15.0	2.6-108.8	0.003
Other eye lesions	23.2	6.8-72.8	0.000	47.0	8.7-238.6	0.000
Other central nervous system lesions	3.8	1.8-12.3	0.05	8.0	2.2-36.8	0.005

\* CD4 levels dichotomised to >200/ $\mu$ L and <200/ $\mu$ L values

Table 4. Ophthalmological findings in various studies.

Characteristics	USA, 1995 <sup>a</sup>	Kenya, 1996 <sup>b</sup>	USA, 1997 <sup>c</sup>	India, 1998 <sup>d</sup>	Present study, 2004
Number of patients	781	102	30	100	460
Human immunodeficiency virus retinopathy	50	25	16	15	54
Blepharitis	0	0	—	2	34
Molluscum contagiosum	0	0	—	1	06
Cytomegalovirus retinitis	37	3	7	17	1
Kaposi's sarcoma	2	2	3	0	0
Other	1*	1*	—	0	12 <sup>†</sup>

\* Toxoplasmosis of the eye.

<sup>†</sup> Conjunctivitis.

In India, the incidence of HIV in men is greater than in women.<sup>10</sup> Due to the low educational status and poverty in the area, most people do not seek medical advice until the disease progresses to an advanced stage. Therefore, female patients and those with early HIV infection were under-represented in this study. Moreover, patients with HIV do not undergo routine eye examinations and were referred for an eye examination only if they had symptoms pertaining to vision. This could give a false impression of a high incidence of eye diseases in studies conducted at referral ophthalmic centres. To estimate the true incidence of eye disease in patients with HIV, the authors undertook routine examination of all patients with HIV, irrespective of their symptoms. Only 19% of patients with HIV had eye manifestations. This incidence was less than that in the USA (50%),<sup>9</sup> Africa (66%),<sup>8</sup> and other Indian studies (42.5%).<sup>5</sup> The reason could be due to the large denominator of asymptomatic patients with HIV in the present study.

HIV retinopathy was the commonest eye manifestation in patients with HIV in this region. HIV retinopathy was also the commonest eye manifestation in other series with an incidence ranging from 25% to 75%.<sup>6,11,12</sup> Retinopathy is a form of microvasculopathy of obscure aetiology, represented by retinal cotton wool spots that rarely interfere with vision. The cotton wool spots can also be seen in patients with diabetes, hypertension, systemic lupus erythematosus, leukaemia, and various other systemic illnesses.<sup>13-15</sup> Microscopic examination of the cotton wool spots in patients with AIDS shows pathological features identical to those seen in association with other disorders. The proposed mechanisms include

ischaemic injury to the nerve fibre layer of the retina, leading to focal interruption to the axonal flow (trafficking of cargoes of organelles and molecules between the cell body) and accumulation of subcellular material. Attempts have been made to investigate the causes of and possible risk factors for HIV retinopathy.<sup>6,16,17</sup> Earlier speculation that these spots represent *P carinii* infection or cytomegalovirus (CMV) have been unsubstantiated.<sup>16,17</sup> Attempts to isolate HIV from these lesions have also been largely unsuccessful.<sup>6</sup> However, some authors have demonstrated HIV antigen in microvascular tissue near the cotton wool spot.<sup>6</sup> This is likely to be due to the following factors:

- active inflammation leads to vacuolitis and consequent ischaemic injury (represented by CRP)
- the innate immune status (CD4) of the patients (as the virus was not proven to be causative in all patients)
- other CNS lesions that might interrupt axonal flow
- other eye diseases that may stimulate local inflammation and consequent changes that may trigger pathogenesis of cotton wool spots as major risk factors.

The univariate analysis disclosed that immunosuppression, positive CRP, other associated eye lesions, and any CNS pathology were significant risk factors. However, when dichotomised CD4 levels, positive CRP, and other associated diseases were simultaneously introduced in conjunction with sex and age as potential confounding factors in a logistic regression model, CD4 levels and CRP lost their significance, while associated diseases such as CNS lesions or other ophthalmological manifestations maintained

their significance. These findings were difficult to interpret as the number of patients in this study was low.

The apparent implication of immune status and CRP, as observed in the univariate analysis, could be secondary to the associated opportunistic infections; it has been shown that opportunistic infections occur in the setting of low immunity (represented by low CD4 count) and will trigger an inflammatory reaction (represented by positive CRP). It is also probable that, even if the CD4 levels are low, it is the absolute decline in the host defence as represented by any opportunistic infection, or an actively ongoing inflammation secondary to the infection (represented by CRP) that makes a patient with HIV likely to develop retinopathy. However, since a detailed evaluation was not performed for these patients, any conclusions would be inappropriate. This point is also reinforced by the observation that, although the majority of these patients had AIDS, only 15% had retinopathy compared with 56% of patients with CNS lesions. The presence of positive CRP could also be explained by this theory.

CMV retinitis is one of the most commonly reported opportunistic infections of the eye, with a prevalence ranging from 15% to 45%.<sup>1-3,5,18</sup> The incidence of CMV retinitis decreased steeply (up to 80%) with the advent of highly active antiretroviral therapy in developed countries.<sup>19</sup> However, the incidence remains high in developing countries. Surprisingly, only 1 patient with CMV retinitis was encountered in this study during the 2-year study period. As this is a preliminary study, further studies are required to ascertain whether this pattern is consistent in this part of India. Other diseases encountered in the study included molluscum contagiosum, an occasionally reported DNA pox virus disease.<sup>20</sup> Several patients had a single small lesion affecting the eyelid but 1 patient had a large number of bilateral lesions.

Neuro-ophthalmic manifestations such as papilloedema, neuritis, and gaze palsies constituted 10% to 15% of all eye manifestations in patients with HIV in one of the largest Indian studies.<sup>5</sup> In the present series, 29.5% of patients had papilloedema but the other manifestations were not found. It is possible that severe blepharitis was due to both immunosuppression and poor hygiene. The frequency of conjunctivitis in this study did not appear to be high compared with the general population and could be due to seasonal eye diseases. *Toxoplasma gondii*,<sup>7</sup> *P carinii*,<sup>21</sup> *Varicella zoster*,<sup>22</sup> and Kaposi's sarcoma<sup>6</sup> are rare in the Indian context.

The commonest eye lesion in this study was HIV retinopathy. CMV retinitis, molluscum contagiosum, and blepharitis were uncommon. The implication of HIV in the development of retinopathy

could be in the pathogenesis of retinopathy because there was a significant number of patients who did not have any other findings or risk factors for the development of retinopathy. However it would be premature to make any conclusions on the risk factors as the number of patients analysed was small.

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# Adjunctive Preoperative Ethylenediaminetetraacetic Acid Drops for Surgical Chelation for Calcific Band Keratopathy

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**Aim:** To evaluate the safety and efficacy of adjunctive preoperative topical 10% ethylenediaminetetraacetic acid solution in addition to intraoperative application of the same agent for reducing intraoperative calcium removal times during surgery for calcific band keratopathy.

**Methods:** In this prospective non-randomised comparative interventional study, 31 eyes of 23 consecutive patients with calcific band keratopathy underwent surgical treatment with intraoperative 10% ethylenediaminetetraacetic acid chelation between January 2002 and December 2004. Eighteen eyes received adjunctive preoperative topical ethylenediaminetetraacetic acid 10% 5 times daily for 3 weeks before surgery (group 1). The remaining 13 eyes did not receive any medication before surgery (group 2). The intraoperative time needed for calcium removal and the corneal re-epithelialisation time were measured in both groups. The patients' symptoms, visual acuities, and ocular findings were recorded preoperatively and postoperatively during the follow-up period.

**Results:** Discomfort and pain were the presenting complaints for all patients in both groups. The mean surgery time for complete removal of corneal calcium deposition in group 1 was 11.00 minutes (SD, 4.54 minutes), and in group 2 the mean time was 18.71 minutes (SD, 4.54 minutes). The difference was statistically significant ( $p = 0.023$ ). All eyes (100%) in group 1 re-epithelialised over a mean time of 3.35 days (SD, 1.49 days). Eleven of 13 eyes (85%) in group 2 re-epithelialised over a mean time of 4.57 days (SD, 1.60 days). The remaining 2 corneas from 2 different patients in group 2 failed to re-epithelialise spontaneously and required autologous limbal grafting. There was no statistically significant difference in the re-epithelialisation times between the 2 groups. The average postoperative time for relief of symptoms was 2.58 days (SD, 1.27 days) for patients in group 1 and 6.71 days (SD, 2.09 days) for patients in group 2, which was statistically significant ( $p = 0.034$ ). Visual acuities improved in 7 of 18 eyes (39%) in group 1, and in 5 of 13 eyes (38%) in group 2. Visual acuities remained at preoperative status for 11 of 18 eyes (61%) in group 1, and 6 of 13 eyes (62%) in group 2.

**Conclusions:** The use of adjunctive preoperative topical ethylenediaminetetraacetic acid solution in addition to intraoperative ethylenediaminetetraacetic acid application reduced the intraoperative calcium removal times in eyes with calcific band keratopathy and was not associated with any adverse effects. Further studies evaluating the efficacy of topical ethylenediaminetetraacetic acid at different dosages, frequencies, and duration are needed to determine optimal treatment guidelines.

**Key words:** Chelation therapy, Corneal opacity, Surgery

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## Introduction

First described by Bowman in 1849, band keratopathy is a chronic degenerative condition characterised by the deposition of extracellular granular material throughout the epithelial basement membrane, Bowman's layer, and anterior stroma.<sup>1</sup> Band

keratopathy may cause blindness as a result of opacification of the cornea, block the visual axis, and cause pain due to corneal epithelial erosions.<sup>2,3</sup>

Patients with band keratopathy often experience ocular pain and decreased vision. Histopathologically, these symptoms may be explained by physical disruption and calcification of the basement membrane leading to recurrent epithelial breakdown, chronic ocular surface instability, and keratocyte loss.<sup>4,5</sup> The absence of an intact and healthy corneal epithelium may ultimately

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progress to complications such as infectious keratitis. Various modalities have been used for the treatment of band keratopathy.<sup>6,7</sup> The most widely used method is ethylenediaminetetraacetic acid (EDTA) chelation. The goal of treatment is to remove the calcium opacities and restore a smooth ocular surface.

Calcium removal is easier in patients who are given adjunctive topical EDTA drops before EDTA chelation surgery compared with those who do not receive any preoperative topical medication. This study was performed to evaluate the safety and efficacy of adjunctive preoperative topical 10% EDTA solution, in addition to intraoperative application of the same agent, in reducing intraoperative calcium removal times during surgery for calcific band keratopathy.

### **Methods**

#### **Patients**

Twenty three consecutive patients (31 eyes) with band keratopathy were recruited from the cornea and external eye disease department of Izmir Atatürk Training and Research Hospital, Izmir, Turkey, between January 2002 and December 2004. The research followed the tenets of the local institution committee, and informed consent was obtained from all patients after explanation of the nature and possible consequences of the study.

Patients were assessed as to whether the indication for surgical treatment was for visual rehabilitation or for ocular surface improvement to alleviate symptoms of pain or discomfort. Patients were divided into 2 groups based on the use of 10% EDTA drops before surgery. For patients in group 1, EDTA drops were instilled 5 times daily for 3 weeks before surgery; patients in group 2 did not receive any topical medications before surgery.

#### **Methods**

A complete history was taken and slit-lamp biomicroscopy was performed for all patients. The outcome measures were number of days to symptom relief, surgery time, time for epithelial healing, and best-corrected visual acuity (BCVA). Complications of treatment were also noted for the safety of the procedure. The visual acuities were measured with Snellen symbols and converted to LogMAR scoring. Patients' symptoms were noted before surgery and persistence or resolution of symptoms was recorded at the last follow-up visit. Surgery time was considered to be the application time of EDTA-soaked cotton tips until the band keratopathy had dissolved. Epithelial healing time was considered to be the time to full epithelial healing. Refraction was initially performed at 4 weeks, and then at each follow-up visit.

Surgical EDTA chelation was performed by a single surgeon. Under topical anaesthesia with proparacaine, the corneal epithelium

overlying the band keratopathy was removed by scraping with a blade. A sterile cotton applicator soaked in 10% EDTA solution was rubbed against the calcium until it dissolved. The length of time of corneal contact with EDTA was recorded for each patient. A therapeutic soft contact lens was placed on the corneal surface and the patients were given topical antibiotics and non-steroidal anti-inflammatory drugs. The contact lens was usually removed after 72 hours, and antibiotics were continued until full epithelial healing had occurred.

#### **Statistical Analysis**

Statistical analysis was performed using the Mann-Whitney *U* test. Statistical significance was accepted as  $p \leq 0.05$ .

### **Results**

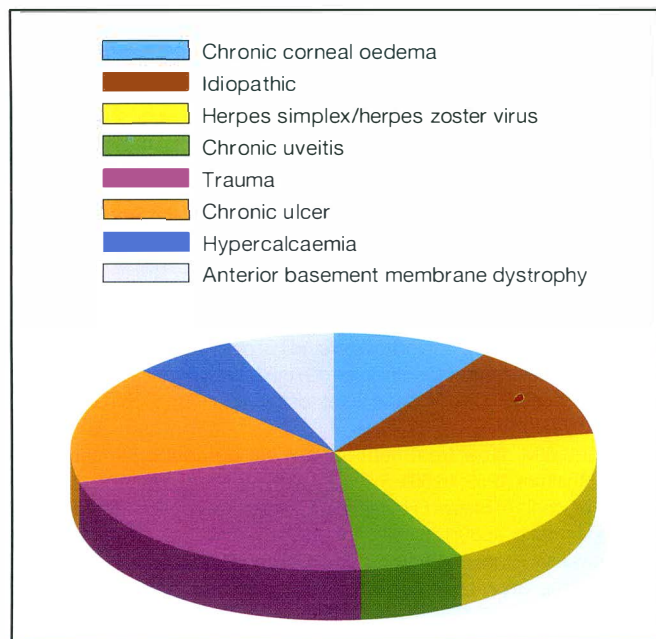
Thirty one eyes of 23 patients were included in the study. There were 7 men and 5 women in group 1 and 6 men and 5 women in group 2. The mean age of the patients in group 1 was 62.22 years (SD, 8.77 years; range, 46 to 74 years) and the mean age of patients in group 2 was 64.87 years (SD, 9.95 years; range, 45 to 78 years). There was no significant difference between the 2 groups for age and sex ( $p > 0.05$ ).

Ten eyes in group 1 (55%) and 7 eyes in group 2 (53%) had central band keratopathy and 8 eyes in group 1 (45%) and 6 eyes in group 2 (47%) had peripheral symptomatic band keratopathy. The causes of band keratopathy were as follows: chronic corneal oedema in 3 eyes (10%), idiopathic keratopathy in 4 eyes (13%), herpes simplex or herpes zoster in 6 eyes (19%), chronic uveitis in 2 eyes (6%), trauma in 7 eyes (23%), chronic ulcers in 5 eyes (16%), hypercalcaemia in 2 eyes (6%), and anterior basement membrane dystrophy in 2 eyes (6%) [Figure 1]. The 2 groups had similar aetiologic factors.

All patients had 1 or more complaints of chronic irritation, tearing, photophobia, or foreign body sensation before EDTA chelation. Preoperatively, there were no significant differences in ocular surface inflammatory markers (injection, swelling) between groups 1 and 2, suggesting that preoperative topical EDTA did not induce any unusual ocular surface inflammation. Postoperatively, patients in groups 1 and 2 displayed similar ocular surface inflammation. All eyes in group 1 and 11 of 13 eyes in group 2 reported partial or complete resolution of their symptoms after EDTA chelation. Two patients in group 2 whose cornea failed to epithelialise were subsequently diagnosed with total limbal stem cell deficiency. One patient required limbal stem cell transplantation, and one patient required limbal stem cell transplantation combined with penetrating keratoplasty.

The mean surgery time for complete removal of corneal calcium deposition in group 1 was 11.00 minutes (SD, 4.54 minutes) and

Figure 1. Causes of band keratopathy.



in group 2 was 18.71 minutes (SD, 4.54 minutes). The difference was statistically significant ( $p = 0.023$ ). All eyes (100%) in group 1 re-epithelialised after a mean time of 3.35 days (SD, 1.49 days). Eleven of 13 eyes (85%) in group 2 re-epithelialised after a mean time of 4.57 days (SD, 1.60 days). The remaining 2 corneas from 2 different patients in group 2 failed to re-epithelialise spontaneously and required autologous limbal grafting. There was no statistically significant difference in the re-epithelialisation times between the 2 groups. The average postoperative time for relief of symptoms for patients in group 1 was 2.58 days (SD, 1.27 days), and for patients in group 2 was 6.71 days (SD, 2.09 days). This difference was statistically significant ( $p = 0.034$ ) [Table 1]. Visual acuities improved in 7 of 18 eyes (39%) in group 1, and 5 of 13 eyes (38%) in group 2. Visual acuities stayed the same for 11 of 18 eyes (61%) in group 1, and 6 of 13 eyes (62%) in group 2. The differences were not statistically significant.

### Discussion

Band keratopathy may cause reduction of visual acuity and glare due to corneal opacification. Band keratopathy may also cause

pain and discomfort secondary to ocular surface instability.<sup>8</sup> The treatment aim is to remove the calcified plaque deposition and restore the smooth corneal surface.<sup>9</sup> Various modalities have been used for the treatment of band keratopathy, with the most widely used method being EDTA chelation.<sup>6</sup> The procedure is performed to remove visual axis opacities and/or stabilise the ocular surface.

When treating calcific band keratopathy with topical EDTA alone without surgery, these authors observed spotty cleaning of the corneal opacities, giving a Swiss cheese-like appearance. This observation suggested the use of preoperative topical EDTA and surgical chelation.

The intraoperative removal of calcium deposition in EDTA-pretreated patients was consistently easier than in those patients who were not pretreated with EDTA. This intraoperative surgical

Figure 2. (a) Before ethylenediaminetetraacetic acid chelation in an eye with central symptomatic calcific band keratopathy — preoperatively an area of band keratopathy extended across the visual axis; and (b) after treatment, the patient's symptoms resolved completely — the eye was not inflamed and the central cornea was clear after 2 days.

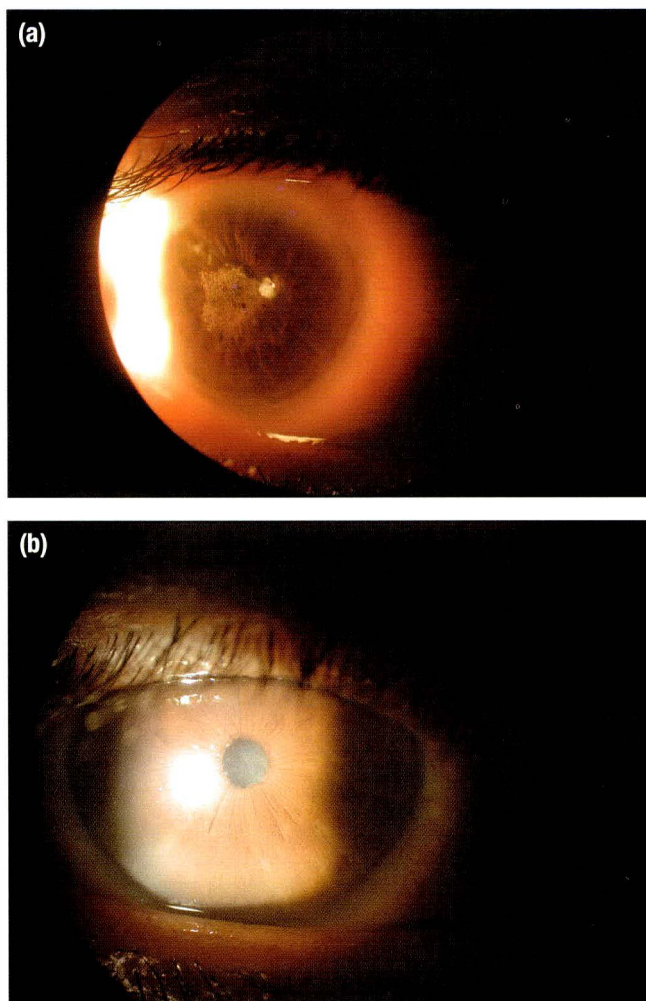


Table 1. Results of surgical chelation for calcific band keratopathy with or without adjunctive preoperative ethylenediaminetetraacetic acid drops.

	Surgery time (SD) [minutes]	Pain relief (SD) [days]	Epithelial healing (SD) [days]
Group 1	11.00 (4.54)	2.58 (1.27)	3.35 (1.49)
Group 2	18.71 (4.54)	6.71 (2.09)	3.92 (1.38)
Total	14.48 (5.93)	4.45 (2.66)	3.61 (1.45)
p Value	0.023	0.034	0.067

observation is supported by the statistically significant decrease in surgery time for complete removal of corneal calcium deposition in patients in group 1 compared with those in group 2 — the mean time of EDTA application until calcium dissolution was 11.00 minutes (SD, 4.54 minutes) and 18.71 minutes (SD, 4.54 minutes) in groups 1 and 2, respectively. These authors believe that the ease of chelation in patients in group 1 was a direct result of the use of EDTA drops preoperatively.

The rate of corneal re-epithelialisation in this study was similar in groups 1 and 2, indicating that topical EDTA was well tolerated, excluding 2 patients in group 2 in whom epithelialisation failed. These 2 patients were subsequently diagnosed with total limbal stem cell deficiency.

All patients in group 1 and 11 of 13 patients in group 2 experienced both symptomatic and visual function improvement. O'Brart et al<sup>10</sup> and Dighiero et al<sup>11</sup> also reported a high percentage of symptomatic improvement after phototherapeutic keratectomy (95% and 85% of patients, respectively). In this study, it was observed that inflammation healed with little discomfort early in the postoperative period, often by the second postoperative day, when a bandage contact lens was in place (Figure 2). This result is comparable with those of other reported studies.<sup>12,13</sup>

No unusual reactions were observed preoperatively or postoperatively in patients who received topical EDTA solution.

This study has shown that the use of adjunctive preoperative topical EDTA solution in addition to intraoperative EDTA application reduced the intraoperative calcium removal times in eyes with calcific band keratopathy and was not associated with any adverse effects. Further studies evaluating the efficacy of topical

EDTA at different dosages, frequencies, and duration are needed to determine optimal treatment guidelines.

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# Chronic Allergic Conjunctivitis: an Evaluation of Environmental Risk Factors

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**Aim:** To identify the pattern of environmental risk factors for chronic allergic conjunctivitis

**Methods:** A case-control study was performed at the Eye Clinic, University College Hospital, Ibadan, Nigeria, between July 2002 and June 2004. Twenty eight patients with clinical features of vernal or atopic keratoconjunctivitis were identified and compared with 28 age- and sex-matched healthy controls.

**Results:** Fifty percent of patients were younger than 10 years. The male to female ratio was 1.8:1. Risk factors for chronic allergic conjunctivitis included use of kerosene or firewood as the main cooking fuel (odds ratio, 2.6; 95% confidence interval, 1.2-5.3;  $p < 0.05$ ), cooking within the living room (odds ratio, 1.9; 95% confidence interval, 1.2-2.9;  $p < 0.05$ ), living within 500 metres of a commercial centre or major transport terminus (odds ratio, 1.8; 95% confidence interval, 1.2-2.9;  $p < 0.05$ ), living in cramped accommodation (odds ratio, 1.6; 95% confidence interval, 0.9-2.6), and rural dwelling (odds ratio, 1.5; 95% confidence interval, 0.9- 2.5).

**Conclusions:** Cooking within the living room, use of kerosene or firewood for cooking, living in close proximity to commercial centres, cramped accommodation, and rural dwelling were significant risk factors for chronic allergic conjunctivitis. Management of patients with allergic conjunctivitis should include counselling for risk avoidance.

**Key words:** Conjunctivitis allergic, Risk factors

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## Introduction

Chronic allergic conjunctivitis (CAC) occurs in 3 forms: vernal keratoconjunctivitis (VKC), atopic keratoconjunctivitis (AKC), and giant papillary conjunctivitis (GPC).<sup>1</sup> VKC is a recurrent, bilateral, interstitial inflammation of the conjunctiva that usually occurs in children and young adults and resolves spontaneously after a course of several years.<sup>2</sup> AKC is characterised by severe chronic external ocular inflammation associated with atopic dermatitis.<sup>3</sup> GPC is an external ocular inflammatory disorder associated with contact lens wear.<sup>4</sup>

VKC is the most common of the 3 types of CAC and is the most studied. VKC has a global distribution with a widely varying incidence. It is less common in northern Europe and North America and more common in the African continent, Mediterranean countries, Central and South America, and the Indian sub-continent.<sup>5,6</sup> VKC has been reported to be the most common conjunctival disease in Ibadan and Benin in Nigeria.<sup>7,8</sup> VKC is the

most common conjunctival disease among children in Lagos, Anambra, and Rivers states.<sup>9-11</sup> Abiose, in a study of children in northern Nigeria, noted that VKC was the second most common ocular disease.<sup>12</sup>

Males are more commonly affected than females and the majority of patients are in the first decade of life.<sup>13</sup> However, Osuntokun and Olurin reported a female preponderance in patients older than 20 years.<sup>7</sup> AKC is generally less common than VKC and tends to occur in adults. AKC is similar in presentation to VKC and it is sometimes difficult to distinguish between the 2 conditions.<sup>14,15</sup> GPC is not common in the tropics and developing countries, as contact lens wear is not common.

The cause of inflammation in VKC and AKC has been identified as an allergic type 1 hypersensitivity reaction to external allergens such as pollen, dust, excessive sunlight (photosensitisation), animal hairs, grass, and feathers.<sup>16</sup> It is generally accepted that geographical, genetic, and environmental factors are influential in the disease.<sup>17</sup>

Treatment involves allergen avoidance and use of pharmacological agents to achieve symptomatic relief. Allergen avoidance can reduce the need for pharmacological treatment.<sup>18</sup>

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VKC is an important cause of ocular morbidity among children in Nigeria, causing much distress and discomfort to patients, and is a predominant cause of absenteeism from school.<sup>8</sup> It can be challenging to treat the disease.<sup>17</sup> There is little in the published literature on the pattern of risk factors for VKC or AKC in Nigeria. The aim of this study was to identify the pattern of environmental risk factors in patients presenting at the University College Hospital, Ibadan, Nigeria, with a view to making recommendations for improved management of the disease.

**Methods**

**Patients**

This was a case-control study performed at the Eye Clinic, University College Hospital, Ibadan, Nigeria, between July 2002 and June 2004. The patients included in the study were mostly children and adults from Ibadan, the capital city of Oyo State, and the nearby towns and villages.

Patients with symptoms of itching eyes associated with limbal or palpebral papillae or cobblestones, or brownish limbal conjunctival discharge suggestive of VKC or AKC were enrolled. Patients with itching eyes but without clinical evidence of chronic limbal or palpebral inflammation were excluded from the study. The controls were healthy people without complaints of itching eyes and with no evidence of ocular inflammation, who had either accompanied relatives to the hospital or had attended the hospital for refractive errors. Twenty eight patients with clinical features suggestive of VKC or AKC were selected and compared with 28 age- and sex-matched healthy controls. The 28 patients were all new patients attended by the principal investigator. Informed consent was obtained from the patients, or their guardian in the case of children.

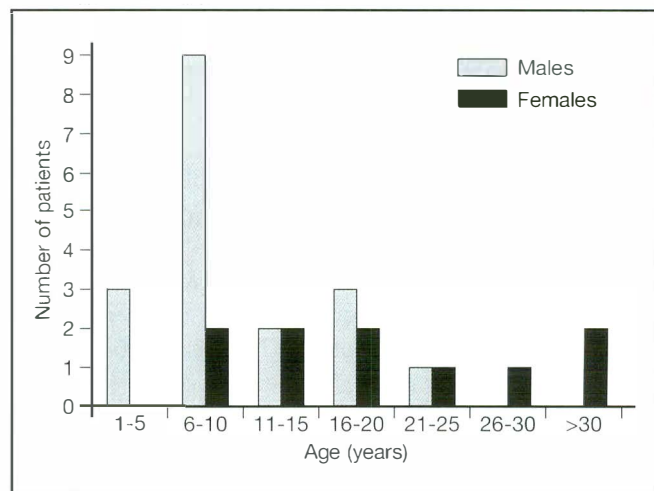
**Design**

Data was collected from the patients and controls through administration of a structured questionnaire. Before commencement of the study, the questionnaire was pretested on 5 potential patients and controls and necessary corrections were made. Information was obtained through interview by a non-medical research assistant who had no knowledge of the patients or controls to reduce bias. Information obtained included location of domicile, type of accommodation, main cooking fuel, location of cooking area, presence of domestic animals, type of home furnishings, and personal and family history of allergy and atopy.

**Statistical Analysis**

The data were analysed using the Statistical Package for the Social Sciences version 13. Statistical analysis consisted of frequency

**Figure 1. Age and sex distribution of patients with chronic allergic conjunctivitis.**



distributions, odds ratios (OR), and 95% confidence intervals (CIs). Statistical significance was  $p < 0.05$ .

**Results**

Fifty six participants, comprising 28 patients and 28 age- and sex-matched controls, were enrolled in the study. The mean age of the participants was 13.5 years (range, 1 to 32 years). Fifty percent of the patients were younger than 10 years. The male to female ratio was 1.8:1. Figure 1 shows the age and sex distribution of the patients.

The commonest symptom was itching, which occurred in 27 patients (96.4%) [Table 1]. Photophobia occurred in 9 patients (32.1%) and discharge was reported by 1 patient (3.6%). Forty one participants (73.2%) lived in urban areas and 15 (26.8%) lived in rural areas. Thirty six participants (64.3%) lived in spacious accommodation such as flats or bungalows, while 20 (35.7%) lived in cramped accommodation such as single-room apartments. Fifty two participants (92.9%) lived more than 500 metres from a major industry such as a manufacturing plant, while only 4 (7.1%) lived within 500 metres of a major industry. Forty three participants (76.8%) lived more than 500 metres away from a major commercial centre or transport terminus (bus station), while 13 (23.2%) lived within 500 metres of a major commercial centre. Thirty three participants (58.9%) used kerosene or firewood as their main cooking fuel, while 23 (41.1%) used either gas or electric stoves.

**Table 1. Eye symptoms of patients with chronic allergic conjunctivitis.**

Symptom	Number of patients (%)
Itching	27 (96.4)
Photophobia	9 (32.1)
Grittiness	2 (7.1)
Pain	1 (3.6)
Discharge	1 (3.6)

Table 2. Environmental risk factors for chronic allergic conjunctivitis.

Environmental factor	Odds ratio	95% Confidence interval	p Value
Cooking with firewood/kerosene	2.6	1.2-5.3	<0.05
Cooking within living room	1.9	1.2-2.9	<0.05
Living within 500 metres of transport terminus	1.8	1.2-2.9	<0.05
Cramped accommodation	1.6	0.9-2.6	>0.05
Rural dwelling	1.5	0.9-2.5	>0.05

Seven participants (12.5%) cooked in their living rooms, while 49 (87.5%) cooked outside the living room such as in a kitchen. Twenty four participants (42.9%) kept domestic animals such as dogs, cats, goats, or chickens, while 32 (57.1%) did not keep domestic pets. Twenty six participants (46.4%) had rug carpets in the living area while 30 (53.6%) had linoleum floor covering, tiles, or bare floors in the living rooms.

More than 66% of patients who used kerosene or firewood as the main cooking fuel had features of CAC, compared with 26.1% of those using gas or electric stoves (OR, 2.6; 95% CI, 1.2-5.3;  $p < 0.05$ ). More than 85% of patients who cooked within the living room had features of CAC compared with 44.9% of those who cooked outside the living room (OR, 1.9; 95% CI, 1.2-2.9;  $p < 0.05$ ). More than 76% of patients who lived within 500 metres of a major commercial centre or transport terminus (bus station) had features of CAC compared with 41.9% of those living more than 500 metres from a major commercial centre (OR, 1.8; 95% CI, 1.2-2.9;  $p < 0.05$ ).

Sixty five percent of patients who lived in cramped accommodation such as single-room apartments had features of CAC compared with 41.7% of those with spacious accommodation such as flats or bungalows (OR, 1.6; 95% CI 0.9-2.6). More than 66% of rural dwellers had features of CAC compared with 43.9% of urban dwellers (OR, 1.5; 95% CI, 0.9-2.5).

Stratified analysis to remove the confounding effect of rural dwelling and firewood and stove cooking showed that 66.7% of rural dwellers cooking with firewood or kerosene had CAC compared with 66.7% of rural dwellers who did not use firewood or kerosene (OR, 1; 95% CI, 0.4-2.5). Firewood and kerosene cooking was a greater risk factor for urban dwellers with 66.7% of users having CAC compared with 20% of non-users. More than 45% of patients with domestic animals had CAC compared with 53.1% of those without domestic animals. Table 2 shows a summary of the environmental factors associated with CAC.

## Discussion

The age and sex distribution of the patients with VKC or AKC in this study compares well with the pattern described in previous studies.<sup>4,10</sup> The peak age was between 6 and 10 years with males being more affected. However, there was a female preponderance

with increasing age. This pattern has been documented in previous studies.<sup>10</sup> The pattern of ocular symptoms was similar to that described in previous studies, with itching being the predominant symptom.<sup>5</sup> However, discharge was not common in this group of patients.

This study found that living close to a major commercial centre, using kerosene or firewood to cook, and cooking in the living room were significant risk factors for CAC. Living close to a major commercial centre increases exposure to environmental air pollutants, especially smoke. The finding that residing close to a major commercial centre confers a risk for CAC is in keeping with findings of previous studies that suggest an interaction between allergic diseases and traffic pollution and indicate that diesel exhaust particles enhance sensitivity to allergens.<sup>19</sup> However, other studies have reported that air pollution is not a major risk factor in the development of atopic diseases.<sup>20,21</sup> It is appropriate to suggest that living close to a major commercial centre is synonymous with living close to an industrialised settlement, which has been implicated as a risk factor by previous studies.<sup>20,22,23</sup>

The use of kerosene or firewood being a risk factor may arise from the fact that exposure to smoke is increased with these sources of fuel when compared with gas and electric stoves. Also, cooking in the living area increases exposure to the smoke from the cooking fuel. It may be postulated that CAC is likely to be more common in cooks and housewives who spend a considerably longer time exposed to smoke from firewood or kerosene stoves than the average individual.

From these results, rural living appears to confer a risk for developing CAC. This appears to be at variance with earlier studies that suggested that allergic eye disease are more prevalent in urban environments. The risk persisted when the possible effect of confounding factors was removed by stratified analysis, suggesting that other yet to be identified rural factors may be responsible; this requires further investigation in the future. Other studies have also reported allergic eye disease to be fairly common in rural environments.<sup>24,25</sup>

This study found that living in cramped accommodation confers a risk for developing CAC. This is in keeping with previous reports that suggest that poor ventilation increases the risk of atopic diseases.<sup>20,21</sup>

This study appears not to support the fact that the presence of domestic animals increases the risk for CAC. A similar finding has been reported by a previous study in which it was found that furred pets did not influence the prevalence of allergy.<sup>21</sup>

Living close to a commercial centre, using kerosene or firewood for cooking, cooking in the living room, rural living, and cramped accommodation confer significant risks for VKC and AKC. Patients should be educated about these risk factors and advised to avoid them as part of the management of CAC.

### Acknowledgement

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# Reversed Sulcus-fixated Posterior Chamber Intraocular Lens Leading to Pupillary Capture

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*Pupillary capture in patients with pseudophakia is an uncommon event, in which part of the intraocular lens is displaced anterior to the iris. This report is of a 69-year-old woman in whom pupillary capture occurred after reversed insertion of a rigid intraocular lens.*

**Key words:** Cataract surgery, Lens implantation, intraocular

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## Introduction

Pupillary capture in patients with pseudophakia is an uncommon event, in which part of the intraocular lens (IOL) is displaced anterior to the iris. The condition has an incidence of 0.6% to 3.0%.<sup>1-3</sup> This report is of a patient in whom pupillary capture occurred after reversed insertion of a rigid IOL. The intention is to raise awareness of a 'forgotten' principle of IOL insertion, given the frequent use of foldable and injectable IOLs, and its impact on training.

## Case Report

A 69-year-old woman presented to the Surgical Cataract Unit at the Wolverhampton and Midlands Counties Eye Infirmary, Wolverhampton, UK, in 2004 with a dense cataract in the right eye. Her vision was counting fingers (CF) and she had an intraocular pressure (IOP) of 18 mm Hg in both eyes. She underwent right phacoemulsification cataract surgery. The pupil was well dilated preoperatively and intraoperatively. After continuous curvilinear capsulorhexis, routine phacoemulsification surgery was performed. However, there was a posterior capsular rent during capsular polishing. Anterior vitrectomy was performed and a rigid polymethyl methacrylate (PMMA) posterior chamber IOL (PCIOL; Rayner™, Model 755U; Rayner Intraocular Lenses Ltd, Hove, UK; optic size, 7.0 mm; overall diameter, 13.5 mm; haptic angulation, 10°) was inserted in the sulcus.

The patient was closely monitored postoperatively. Her IOP was controlled with oral acetazolamide SR 250 mg once daily for 1 week and her vision improved to 6/18 unaided. However, she had mild anterior uveitis and slight corneal oedema 1 day after

surgery, which was treated with topical 1% prednisolone and 0.5% chloramphenicol 4 times per day.

On day 32, she had a sudden decrease in vision to CF and a raised IOP of 42 mm Hg. Slit-lamp biomicroscopy showed corneal epithelial oedema. The anterior chamber was shallow in the periphery but deep centrally, with slight iris bombe. There was complete pupillary capture with the optic overlying the iris and the haptics remaining in the sulcus (Figure 1a). On maximal dilatation, the direction of the haptic was noted to be pointing clockwise, and confirmed the diagnosis of reversed IOL insertion (Figure 1b). Her IOP was controlled with acetazolamide 500 mg intravenously, topical 0.5% timolol twice a day and 1% apraclonidine 3 times a day. An attempt at maximal dilatation with topical 1% cyclopentolate, 10% phenylephrine, and supine posture proved unsuccessful. Neodymium:YAG laser peripheral iridotomy was not performed as the IOP was well controlled with antiglaucoma treatment. IOL exchange was planned and performed the next morning. The anterior chamber was deepened with 1% sodium hyaluronate, the IOL was explanted and replaced with the same rigid PMMA PCIOL. Peripheral iridectomy was also performed to prevent further pupillary block. She was given topical 1% prednisolone 4 times a day, 0.5% chloramphenicol 4 times a day, and 0.5% timolol twice a day. Treatment resulted in a rapid visual recovery to 6/9 and the IOP was controlled at 12 mm Hg. At her last follow-up visit, her vision was 6/6 and her IOP was 18 mm Hg with a stable, correctly placed IOL.

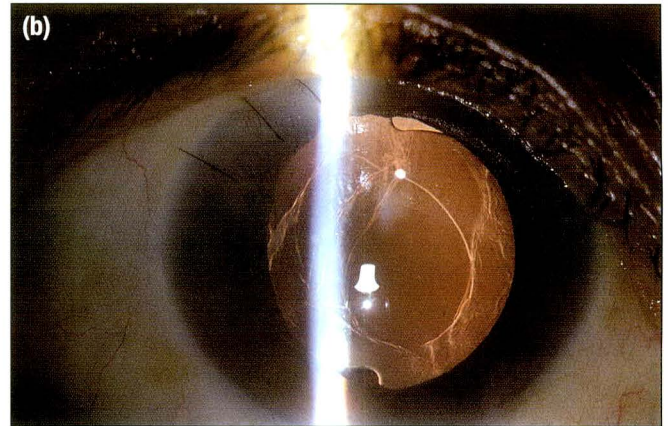
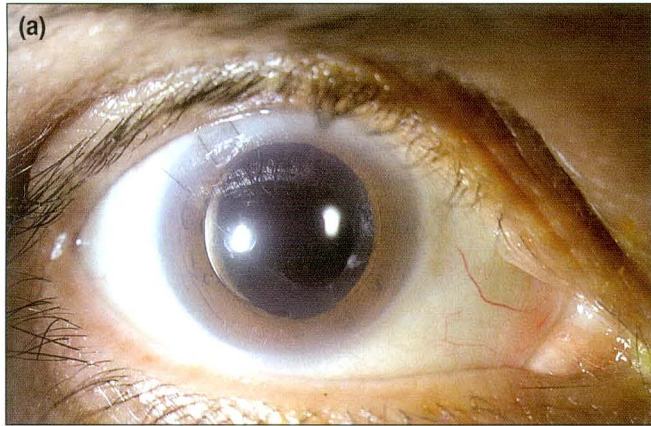
## Discussion

Phacoemulsification is a commonly performed procedure for cataract surgery. Reversed PCIOL is a rare complication of phacoemulsification cataract surgery, which can cause pupillary capture or capsular block syndrome, and may affect the refractive

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## Pupillary Capture after Reversed Insertion of an Intraocular Lens

Figure 1. A patient with pupillary capture after reversed insertion of an intraocular lens. (a) The optic edge is lying over the anterior surface of the iris; and (b) the reverse direction of the haptics.



outcome. This is due to the 5° to 10° angulation between the haptic and optic, which moves the optic forward and increases the risk of pupillary capture.<sup>4,5</sup> Sulcus-fixated PCIOL increases the risk of pupillary capture because of forward placement of the optic and haptics. Pupillary capture of a PCIOL has been reported as a finding when the patient attends for a routine examination or because the capture causes pain, blurred vision, or pupillary block with secondary glaucoma.<sup>6,7</sup>

The management of pupillary capture includes simple dilatation followed by use of miotic agents, which has a relatively low success rate, and non-surgical manoeuvres, including digital manipulation.<sup>7</sup> These procedures are less likely to succeed for a reversed sulcus-fixated PMMA lens as there is risk of recurrence of pupillary capture. Surgical management includes IOL exchange for a PMMA lens and IOL rotation of an acrylic/silicone lens.

The key message of this report is for surgeons to be aware of this potential complication with both PMMA and injectable lenses. Therefore, it is extremely important to pay attention to the direction of the IOL. If this complication is noted after insertion, it is better

to remove the PMMA lens and reinsert it. For a silicone/acrylic lens, the anterior chamber should be deepened with viscoelastic substances followed by full rotation of the lens in the bag.

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# Pars Plana Vitrectomy for Macular Detachment with Optic Disc Pit

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*Congenital cavitory anomalies of the optic disc that may be associated with serous detachment of the macula include optic disc pit, optic nerve head coloboma, and morning glory disc anomaly.<sup>1</sup> The embryological basis of optic disc pit is not clear but has been attributed to abnormal closure of the embryonic ocular fissure. This report is of a patient with temporal optic nerve pit with serous macular detachment and an outer lamellar macular hole that was treated successfully with internal gas tamponade.*

**Key words:** Abnormalities, Congenital, Optic disc, Optic nerve

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## Introduction

Congenital cavitory anomalies of the optic disc that may be associated with serous detachment of the macula include optic disc pit, optic nerve head coloboma, and morning glory disc anomaly.<sup>1</sup> The embryological basis of optic disc pit is not clear but has been attributed to abnormal closure of the embryonic ocular fissure.<sup>2</sup> Serous macular detachment with outer lamellar macular hole develops in 25% to 75% of patients with optic nerve pit and is more commonly seen with temporally located pits.<sup>3</sup>

The origin of subretinal fluid is controversial but is most probably from the vitreous cavity or subarachnoid space.<sup>4</sup> Uncertainty about the origin of subretinal fluid may be responsible for the inability to institute proper treatment, which subsequently leads to treatment failure. The outcome of surgery is poor due to a high recurrence rate.

Three patients were treated with pars plana vitrectomy and internal gas tamponade at the Department of Ophthalmology, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry, India — none of the patients had a recurrence after 3 years of follow-up. This report is of 1 of the 3 patients with temporal optic nerve pit with serous macular detachment and an outer lamellar macular hole that was treated successfully.

## Case Report

A 38-year-old man presented to the Department of Ophthalmology, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry, India, in 2002 with sudden onset of painless decrease in vision in the left eye associated with metamorphopsia of 1 month duration. He had no history of previous similar episodes.

Ocular examination revealed visual acuity of 4/60 in the left eye with central scotoma. Pupillary reactions were normal. Fundus examination revealed optic disc pit on the temporal aspect of the optic disc measuring 400  $\mu\text{m}$  in diameter. There were associated posterior vitreous detachment, a retinoschisis-like cavity temporal to the optic disc, and serous macular detachment along with a lamellar macular hole (Figure 1).

Fluorescein angiography study of the left eye revealed hypofluorescence of the optic disc pit in all phases. Peripapillary hyperfluorescence was seen in the early venous phase, which persisted in the later phases. The macular area showed a granular pattern of hyperfluorescence corresponding to the central retinoschisis-like cavity (Figure 2). Optical coherence tomography examination revealed multiple cystic cavities in the outer plexiform layer and an outer lamellar macular hole in the centre (Figure 3).

The cavity persisted despite giving rows of argon laser photocoagulation temporal to the optic disc. The patient subsequently underwent pars plana vitrectomy with internal gas tamponade. The postoperative period was uneventful and the patient recovered with best-corrected vision of 6/18. After 3 years of follow-up, there has been no recurrence and the vision remains stable.

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Figure 1. Photograph of (a) the right eye showing a normal fundus; and (b) the left eye showing a temporal located optic disc pit and associated serous macular detachment.

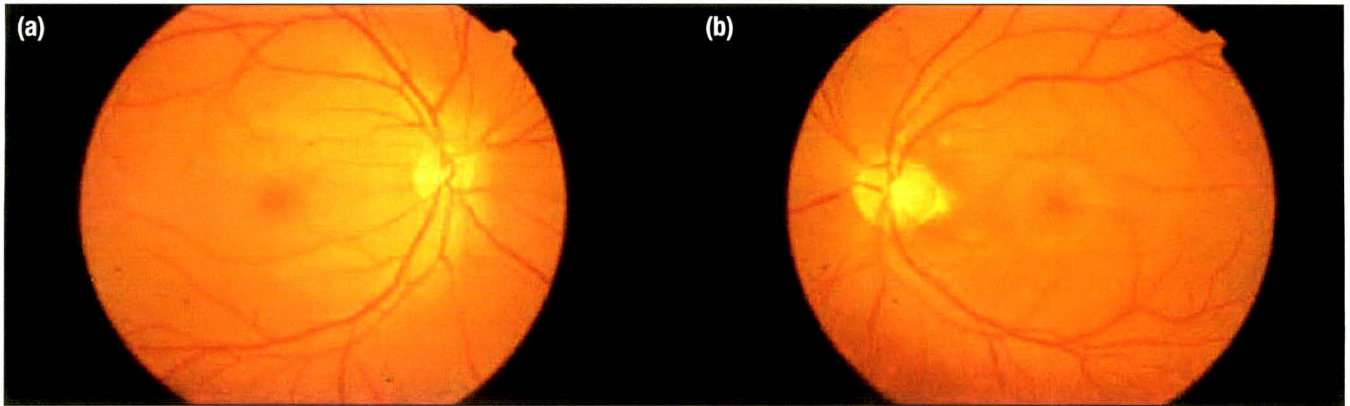
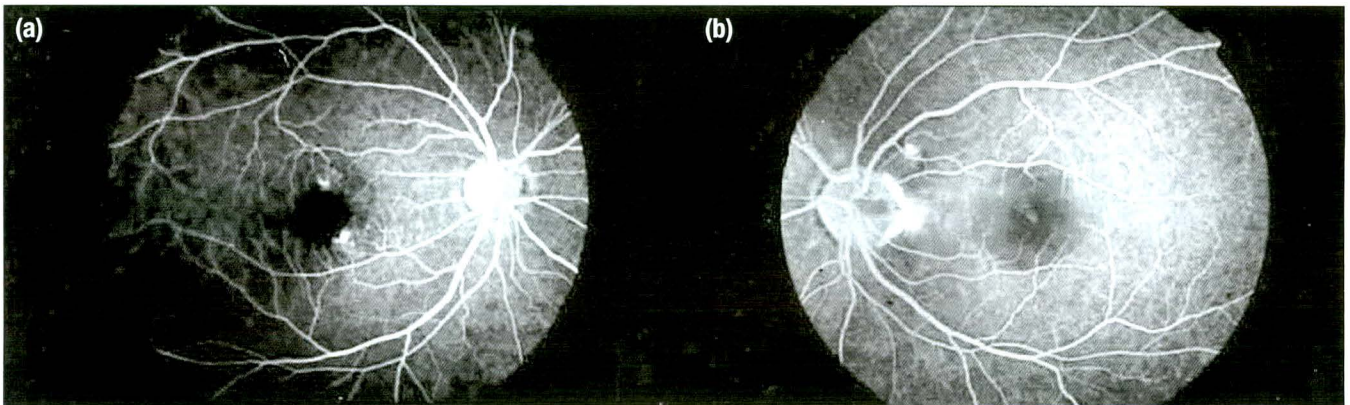


Figure 2. Fluorescein angiography of (a) the right eye in venous phase showing 2 hyperfluorescent areas corresponding to pigment epithelial detachment; and (b) the left eye in late venous phase showing a hypofluorescent optic disc, peripapillary hyperfluorescence, and granular hyperfluorescence of the macula.



### Discussion

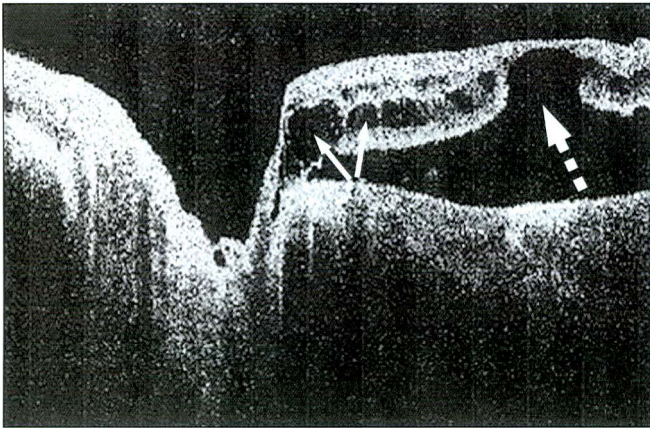
Optic disc pit is a congenital anomaly that probably results from malclosure of the embryonic ocular fissure.<sup>2</sup> Optic disc pit is located on the temporal side of the disc in 72% of patients.<sup>5</sup> The mean age of presentation is 30.9 years, although optic disc pit is seen in children.<sup>5</sup> The source of subretinal fluid is controversial and is usually considered to be either vitreous or subarachnoid fluid, or leaking fluid from the blood vessels in the area of the optic disc pit, which enters the subretinal space.<sup>6</sup>

Sugar proposed the most commonly accepted theory for the source of the fluid.<sup>7</sup> This author suggested that fluid from the vitreous leaked through the optic pit to fill the subretinal space. Brown et al demonstrated that more than 75% of patients with optic disc pit and associated serous macular detachment have posterior vitreous detachment (PVD), while most of the patients without macular detachment did not have PVD.<sup>5</sup> The presence of PVD would allow the liquefied vitreous to be contiguous with the optic disc cavity. In support of the vitreous theory, Bonnet observed the presence of subretinal gas postoperatively in patients with optic disc pit who underwent pars plana vitrectomy with

internal gas tamponade without barrage photocoagulation.<sup>3</sup> Similarly Johnson and Johnson observed the presence of silicone oil postoperatively in a patient for whom silicone oil was used intraoperatively, although fluid-air exchange was done and gas was used for internal tamponade.<sup>4</sup> This disc fluid accumulates in the retinal stroma, mostly in the outer plexiform layer and, if severe, forms a retinoschisis-like cavity. The fluid then enters the subretinal space either through an obvious outer lamellar macular hole or through invisible breaks in the outer retina.<sup>4</sup> Despite several different theories, it is not clear why serous macular detachment first occurs in adults. Brown and Tasman suggested that PVD may be a precipitating factor for serous macular detachment.<sup>6</sup>

The presence of a retinoschisis-like cavity and its communication with the optic disc pit cavity is responsible for the failure of treatment.<sup>4</sup> The detached retina develops cystic changes and subsequently develops an outer lamellar macular hole and, occasionally, a full thickness macular hole (in 1.3% of patients).<sup>5</sup> The most striking feature of this condition is the rapidity of the extension of a lamellar hole to a full thickness hole. A lamellar hole can progress to full thickness within a few months.

**Figure 3. Optical coherence tomography showing multiple cystic cavities (arrow) and an outer lamellar hole (dotted arrow).**



Several medical and surgical interventions such as systemic steroids, optic nerve sheath decompression, and scleral buckling procedures have been employed to clear the serous macular detachment seen in association with optic disc pits, but none met with much success.<sup>8</sup> Persistence of the communication between the optic disc pit and the source of fluid may be responsible for the high incidence of recurrence after surgery.<sup>4</sup> Thus, argon laser photocoagulation has been applied to the elevated retina between the optic disc pit and the serous macular detachment to obliterate the communication between the optic disc pit and the serous macular detachment. This procedure has had good anatomical success but poor functional success, which is partly due to damage to the papillomacular bundle and partly due to associated damage to the macular retina.<sup>5</sup>

Pars plana vitrectomy with internal gas tamponade and barrage photocoagulation has been found to be very effective in treating patients with optic disc pit with serous macular detachment. This procedure is intended to both remove the source of the fluid and obliterate the communication between the cavity and the optic disc pit. The procedure reduces the rate of recurrence of macular detachment. The functional and anatomical success following vitrectomy in this patient suggests that the source of fluid was liquefied vitreous. This was in accordance with other studies.<sup>1,4</sup> However, the possibility of recurrences requiring repeated surgical intervention should be kept in mind and these patients require long-term follow-up.

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# Conjunctival Malignant Melanoma Arising from Caruncle Naevus

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*A 47-year-old man presented with a naevus in the caruncle of the right eye since childhood, which transformed into malignant melanoma of the conjunctiva. Investigations for disseminated melanoma were negative. Despite exenteration of the right orbit, the patient developed secondary metastases in a cervical lymph node and died 9 months later. This patient is reported in view of the rarity of malignant melanoma of the conjunctiva arising from the caruncle.*

**Key words:** Conjunctiva, Melanoma, Naevus

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## Introduction

Conjunctival melanoma occurs approximately 40 times less often than choroidal melanoma. Considerable controversy surrounds the origin of malignant melanoma of the conjunctiva, its natural history, and the optimal management. Conjunctival melanoma is a rare unilateral condition accounting for approximately 2% of all ocular malignant lesions. The annual incidence in western populations is between 0.02 and 0.05 per 100,000 people.<sup>1</sup> Seventy one percent of conjunctival melanomas arise from primary acquired melanosis with atypia, while 17% arise from conjunctival naevi.<sup>2</sup> However, a de novo growth was found to be the most frequent presentation in a recent study.<sup>3</sup> This report is of a rare occurrence of conjunctival melanoma arising from a long-standing caruncle naevus that transformed into malignancy.

## Case Report

A 47-year-old man was first seen at the Department of Ophthalmology, University of Malaya, Kuala Lumpur, Malaysia, in April 1996 for a pigmented conjunctival and lower lid lesion of the right eye since childhood (Figure 1). The lesion was painless and had gradually increased in size during the previous 3 years. Ocular examination revealed normal visual acuity of 6/6 in both eyes. The right globe showed medial bulbar conjunctival melanosis extending inferiorly to invade the lower fornix and medial two-thirds of the lower lid margin and skin (Figure 2). The lesion was flat

and hyperpigmented. The cornea and limbus were not involved, and the rest of the anterior segment and fundus were normal. The left eye was normal.

**Figure 1.** Photograph taken 10 years prior to presentation showing a pigmented lesion in the right caruncle.

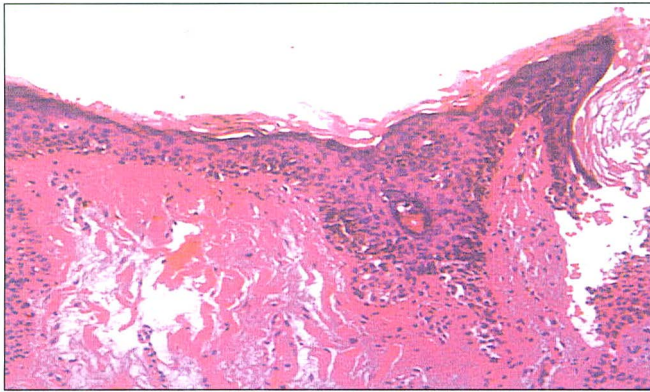


**Figure 2.** View of the right eye at first presentation in April 1996 showing medial bulbar conjunctival melanosis extending inferiorly to invade the lower fornix and the medial two-thirds of the lower lid margin and skin.



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**Figure 3.** Naevus with proliferation of melanocytes at the epidermal-dermal junction (haematoxylin and eosin; original magnification, x 10).



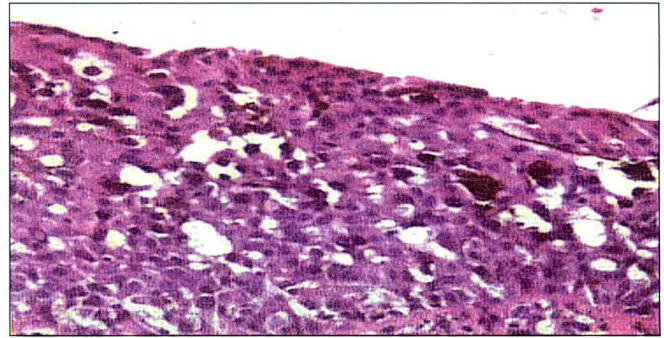
A biopsy taken from the lower fornix of the right eye revealed an intraepithelial conjunctival naevus with no evidence of malignancy. The patient was followed up annually for the following 2 years, with no change in the size of the lesion. In March 1999, an increase in the size of the lesion involving the superior bulbar conjunctiva was noted. Repeat conjunctival biopsies from the superior bulbar, inferior forniceal conjunctiva, and the lower lid margin revealed an intraepithelial conjunctival naevus and intraepidermal naevus of the eyelid skin (Figure 3).

Within the next year, the patient noted a further increase in the size of the hyperpigmented lesion in the right eye. In June 2000, the right globe showed a diffuse hyperpigmentation of the medial bulbar, lower palpebral, and forniceal conjunctiva extending up to 5 mm of skin below the lower lid margin. The lesion had also extended superiorly into the upper palpebral conjunctiva showing multiple nodules (Figure 4). The rest of the ocular examination of the right eye was normal. There was no palpable liver or spleen, or regional lymph node enlargement. A repeat biopsy of the pigmented lesions showed masses of malignant naevus cells with marked nuclear pleomorphism, hyperchromatism, abnormal mitosis, and abundant melanin pigments, which were suggestive

**Figure 4.** Diffuse hyperpigmentation of the medial bulbar, upper and lower palpebral, and forniceal conjunctiva extending up to 5 mm of skin below the lower lid margin in June 2000.



**Figure 5.** Malignant melanoma showing masses of malignant naevus cells with marked nuclear pleomorphism, hyperchromatism, abnormal mitosis, and abundant pigmented melanocytes in the epithelium (S100 antigen; original magnification, x 20).

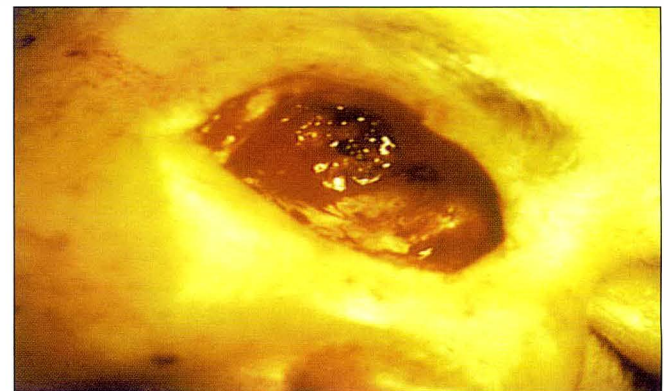


of malignant melanoma (Figure 5). Investigations for disseminated melanoma, including computed tomography scans of the head, neck, thorax, and abdomen, were negative.

The diagnosis, the prognosis of the disease, and the option of orbital exenteration were explained to the patient. The patient underwent exenteration of the right orbit including the eyelids, with temporalis rotation flap in June 2000 (Figure 6). Intraoperative findings showed an intact orbit with no bony erosions. Histological examination of the exenteration specimen confirmed the presence of conjunctival melanoma, and all resected margins were apparently free from tumour cells. Postoperatively, the wound healed well.

After the exenteration, the patient was followed up monthly until December 2000, when a metastatic examination revealed an enlarged left cervical lymph node, measuring 1.2 x 1.0 cm. Histological examination of the lymph node showed diffuse infiltration by malignant cells, confirming the presence of metastatic malignant melanoma. At this juncture, the patient refused all medical intervention and chose traditional Chinese therapy. He was then lost to follow-up and later found to have died in April 2001 due to complications of advanced metastatic disease.

**Figure 6.** Immediate postoperative photograph of the right eye after exenteration.



### Discussion

The occurrence of a naevus in the caruncle has been reported to be 15% compared with 72% in the bulbar conjunctiva.<sup>4</sup> Malignant melanoma arising in a naevus is extremely rare. In a study of 410 consecutive patients with conjunctival naevus, only 3 patients developed malignant melanoma during a mean interval of 7 years follow-up.<sup>5</sup> The location of malignant melanoma in the caruncle has been reported to be only 1% compared with 92% in the bulbar conjunctiva.<sup>6</sup>

The major challenge in the diagnosis of conjunctival melanomas arising in the naevus is that a pre-existing blemish that the patient remembers may have represented the radial growth phase (which can last for years) of a lesion that was always premalignant. For example, in the patient reported here, the conjunctival and eyelid skin biopsies showed proliferation of naevus cells confined to the covering epithelium with no evidence of malignancy. Melanoma arising from a pre-existing naevus is often heralded by rapid growth of the lesion or by increased vascularity. Pathologically, it is possible that 'junctional nests' within some superficial spreading lesions have been misinterpreted as evidence of persistent naevus activity. Furthermore, the evasive cells of a conjunctival melanoma may have different morphologic features; some are smaller more benign looking and mimic naevus cells.<sup>7</sup> It is likely that the melanoma in this patient arose from a pre-existing naevus that had undergone malignant change.

The 5-year survival rate after surgery and/or radiotherapy for melanoma was 84%,<sup>3</sup> and the 10-year survival rate was 71%,<sup>7</sup> as reported in different studies. The most frequent site of metastasis is the lung, followed by the liver, brain, and bone.<sup>3</sup> Poor prognostic features include tumour thickness, mixed cell type, and lymphatic invasion on histological examination;<sup>7</sup> tumour in unfavourable locations (caruncle, palpebral conjunctiva, or forniceal conjunctiva); moderate to severe atypia; paucity of small polyhedral cells in the tumour; invasion of deeper ocular tissues; more than 5 mitotic figures per 10 high-power fields; and lack of an inflammatory response induced by the tumour.<sup>8</sup>

Surgical excision with adjunctive cryotherapy seems to be the most accepted mode of treatment, with some authors preferring brachytherapy over cryotherapy, particularly in the management of local recurrences. The use of topical mitomycin C as part of the therapeutic arsenal also looks promising.<sup>1</sup> The role of orbital exenteration in the management of malignant melanoma of the conjunctiva remains controversial. Exenteration is done for local debulking of the tumour, and this procedure is not associated with increased patient survival.<sup>9</sup>

This patient had a poor prognosis with a high risk for metastasis because of the position of the tumour in an unfavourable location and involvement of the lower lid margin. The poor survival despite orbital exenteration suggests that metastasis had already occurred at the time of surgery which was not evident in routine screening.

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# Keratic Precipitates in Bilateral Vernal Corneal Ulcer

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*Vernal keratoconjunctivitis is a bilateral recurrent inflammatory disorder of the conjunctiva and the cornea. Vernal keratoconjunctivitis has the potential to produce serious vision-threatening complications and severe cases present with shield ulcers. Keratic precipitates have never been reported in vernal keratoconjunctivitis. This report is of a patient with vernal keratoconjunctivitis and bilateral shield ulcers with keratic precipitates.*

**Key words:** Conjunctiva, Conjunctivitis, allergic, Cornea

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## Introduction

Vernal keratoconjunctivitis (VKC) is a bilateral recurrent inflammatory disorder of the conjunctiva and the cornea. VKC has the potential to produce serious vision-threatening complications. Clinically, VKC presents with symptoms of itching, tearing, photophobia, discharge, and redness, and signs include hyperaemia, papillary hypertrophy, limbal conjunctival hypertrophy, and trantas spots. Severe cases present with shield ulcers. Keratic precipitates have never been reported in VKC. Keratic precipitates and leukocytic infiltrates of the cornea represent an inflammatory response. This is brought about by adhesion of circulating leukocytes to the endothelium by adhesion molecules present on target cells. These adhesion molecules are upregulated by proinflammatory cytokines. Intercellular adhesion molecule 1 (ICAM-1) is one such adhesion molecule, which plays a significant role in the pathogenesis of VKC.<sup>1</sup> This report is of a patient with VKC and bilateral shield ulcers with keratic precipitates.

## Case Report

A 12-year-old boy presented to the Department of Ophthalmology, Postgraduate Institute of Medical Education and Research, Chandigarh, India, in 2003 with redness, pain, and decreased vision in both eyes of 10 days duration. The patient had been having symptoms of itching, tearing, ropy discharge, and photophobia for the previous 4 years. These symptoms varied with the seasons but, for the previous year, they had been present all year with exacerbation during spring. The child had also been asthmatic since

the age of 4 years, for which he used a salbutamol inhaler and had previously taken systemic steroids as required. When the child first presented, he had giant papillae on both the upper palpebral conjunctivae, along with a single large shield ulcer (grade III) on the cornea in both eyes. The shield ulcer was larger in the left eye than the right eye. Visual acuity was 6/36 and 6/60 in the right and left eyes, respectively.

Clinical findings were consistent with a diagnosis of severe VKC with bilateral vernal ulcer (Figures 1a and 1b). Surgical debridement of the plaques was done in the emergency operating room and the debrided material was sent for microbiological examination. On routine slit-lamp examination after surgical debridement of the ulcers, the underlying corneal endothelium showed multiple keratic precipitates in both eyes, limited to the area corresponding to the vernal ulcer (Figure 1). There was no cellular reaction in the anterior chamber. Culture was negative for bacteria and fungus. The keratic precipitates and shield ulcer resolved within 1 week of intensive treatment with topical steroids (Figures 1c and 1d). Visual acuity improved to 6/9 in the right eye and 6/12 in the left eye.

## Discussion

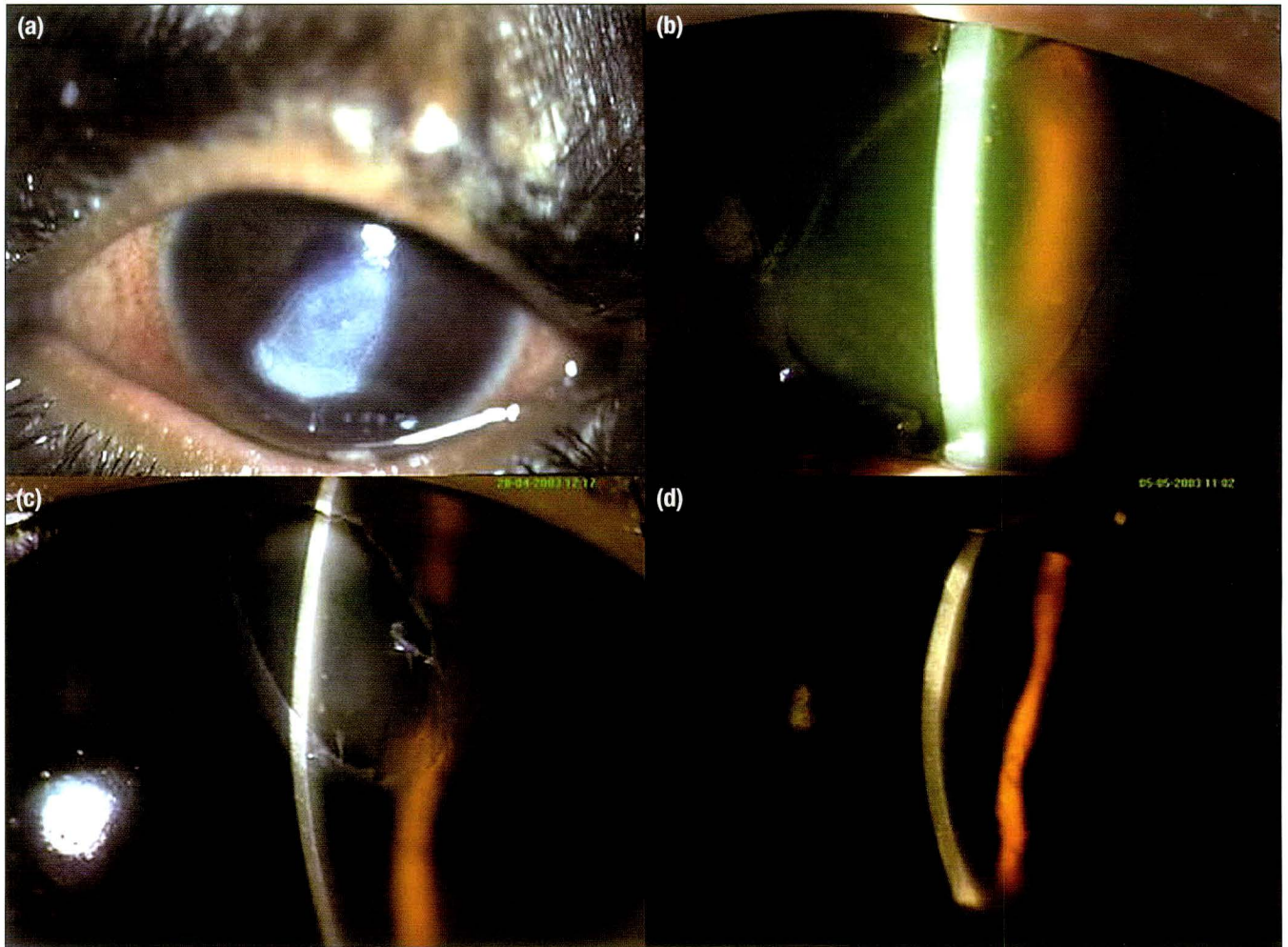
Shield ulcer occurs in 3% to 20% of patients with VKC.<sup>2,3</sup> The management of shield ulcer is surgical debridement combined with intensive topical steroids. This patient had grade III shield ulcers, which responded well to this treatment. The pathogenesis of these ulcers is believed to involve a combination of mechanical damage to the corneal epithelium by giant papillae and toxic epitheliopathy from inflammatory mediators secreted by eosinophils and mast cells. Keratic precipitates in shield ulcer of VKC have not been described to date.

Various cellular adhesion molecules, including ICAM-1, are increased in the conjunctiva of patients with VKC.<sup>1</sup> The mechanism

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## Keratic Precipitates in Bilateral Vernal Corneal Ulcer

Figure 1. Vernal keratoconjunctivitis with bilateral vernal ulcer. (a) Slit-lamp examination showing the right eye with a large shield ulcer; (b) keratic precipitates visible adjacent to the slit-lamp beam after debriding the plaque; (c) the left eye shows keratic precipitates just below the slit lamp (seen after debriding the ulcer); and (d) the ulcer has healed and the keratic precipitates have disappeared 1 week after treatment.



of keratic precipitate formation in keratitis, anterior ocular inflammation, and corneal graft rejection has been described.<sup>4</sup> Shield ulcer is a severe form of VKC. Proinflammatory cytokines are upregulated in VKC. These augment the expression of ICAM-1 on the corneal endothelial cell. Elnor et al report immunohistochemically detectable ICAM-1 on the normal corneal endothelium and stromal keratocytes.<sup>4</sup> Proinflammatory cytokines enhance expression of ICAM-1 that binds to the leukocyte function antigen-1 receptor present on all leukocytes and leads to significant leukocyte adhesion to the corneal endothelium. These lesions are clinically visible as keratic precipitates. Enhanced ICAM-1 expression by cytokines provides a mechanism for the attachment of leukocytes at sites of inflammation. Patients with severe VKC need intensive treatment with steroids. VKC with severe shield ulcer may represent a very aggressive form of inflammatory disease

with keratic precipitates. The shield ulcer plaque should always be debrided and keratic precipitates should be looked for on the corneal endothelium. If present, keratic precipitates may further indicate the severity of the disease process.

Further studies into the prevalence of keratic precipitates in severe VKC with shield ulcer are required to corroborate this finding.

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# Multiple Conjunctival Lesions in a Patient with Polyarteritis Nodosa and Familial Mediterranean Fever

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*This report is of an 18-year-old man with familial Mediterranean fever and polyarteritis nodosa with multiple subconjunctival nodular lesions in both eyes. Detailed ophthalmological examination showed bilateral multiple conjunctival nodular lesions. Histopathological examination revealed adipocytes, increased congested vascular structures, and plasma cell infiltration in fibrous tissue samples; a benign atypical lipoid tumour was diagnosed. Open angle glaucoma was also present. Various ocular pathologies, including episcleritis, anterior uveitis, panuveitis, retinal tear, and rhegmatogenous retinal detachment have been reported in association with familial Mediterranean fever. The unique feature of this patient was the unusual coexistence of familial Mediterranean fever and polyarteritis nodosa with bilateral conjunctival atypical lipoid tumours and glaucoma.*

**Key words:** Conjunctival neoplasms, Familial Mediterranean fever, Glaucoma, Polyarteritis nodosa

*Asian J Ophthalmol.* 2006;8:161-3

## Introduction

Familial Mediterranean fever (FMF) is caused by mutations in the gene encoding pyrin and is characterised by self-limiting recurrent attacks of fever, peritonitis, pleuritis, arthritis, and erysipelas-like erythema.<sup>1-7</sup> Pyrin protein interacts with other proteins involved in inflammation and apoptosis, and can cause renal failure by amyloidosis if left untreated.<sup>1-7</sup> Some vasculitic diseases, including polyarteritis nodosa (PAN), Henoch Schonlein purpura, and Behçet's disease can coexist with FMF.<sup>1-3</sup> PAN is a vasculitis of the small- and medium-sized arteries, and is characterised by immune complex deposition, inflammation, and necrosis of the intimal and medial layers of vessel walls.<sup>1-3</sup> Skin vasculitis, myalgia, peripheral neuropathy, hypertension, and renal, central nervous system, and gastrointestinal system involvement are frequently seen. Approximately 0.8% of individuals with FMF have PAN.

Various ocular pathologies such as uveitis, episcleritis, and retinal changes have been reported in patients with FMF.<sup>3-7</sup> These conditions may be due to inflammation associated with FMF. However, to the authors' knowledge, there have been no previous reports of ocular findings in patients with coexisting FMF and PAN.

This report is of a patient with FMF and PAN with previously unreported ocular findings.

## Case Report

An 18-year-old man with FMF and PAN was referred to the Ankara Ulucanlar Eye Research Hospital, Ankara, Turkey, in May 2004 for redness and multiple conjunctival nodular lesions in both eyes for the previous 3 years. He had no pain or irritation.

According to his medical history, he had had recurrent short attacks of fever and abdominal pain at the age of 6 years. On the basis of the clinical findings and a favourable response to colchicine treatment, FMF was diagnosed. At the age of 12 years, he had weakness, malaise, and severe myalgia in addition to abdominal pain, and a diagnosis of PAN was made according to the muscle biopsy, which showed infiltration of vessels and perivascular areas by polymorphonuclear neutrophils and intimal proliferation. He had been treated with long-term prednisolone 0.5 to 1 mg/kg/day for 4 years. Corticosteroid therapy had been tapered and stopped twice, but was restarted due to severe relapse. The patient had had annual ophthalmological examinations during this time, but no ocular pathologies were detected, except for conjunctival lesions at the age of 15 years. Aseptic femur necrosis occurred at the age of 16 years and corticosteroid therapy was discontinued. Colchicine 1.0 mg twice daily and cyclosporine 100 mg/day were started and

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Figure 1. Slit-lamp appearance of the largest conjunctival nodular lesion.

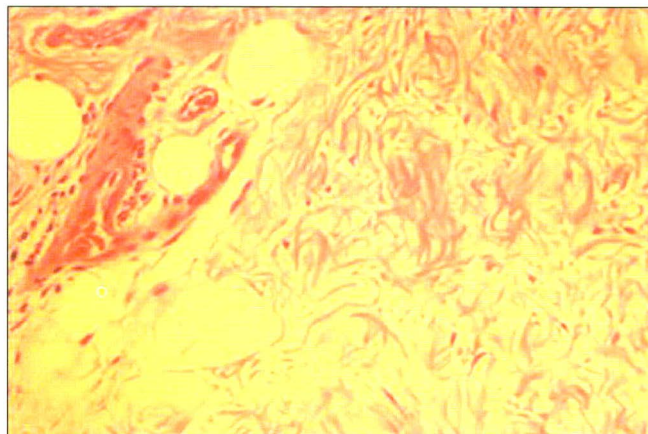


the systemic symptoms of both diseases have been controlled. He has had no renal involvement.

At presentation to the Ankara Ulucanlar Eye Research Hospital, his best-corrected visual acuity was 20/20 in both eyes. Slit-lamp biomicroscopic examination revealed bilateral multiple conjunctival nodular lesions adherent to the conjunctival and scleral tissues (Figure 1). The intraocular pressure (IOP) was measured twice daily for 3 days with a Goldmann applanation tonometer and the mean IOP was 23 mm Hg in the right eye and 24 mm Hg in the left eye. Fundus examination with a 90 D lens revealed a cup-disc ratio of 0.6. There were large pores on the lamina cribrosa and notches at the inferior and superior part of the disc. There were bends in the retinal vessels as they shifted from a vertical orientation along the cup wall to a horizontal orientation on the retinal surface in both eyes. Perimetric examination showed enlargement of the blind spot and an absolute arcuate scotoma, involving the entire superonasal and half of the superotemporal quadrant, in the right eye, with a mean deviation (MD) of -12.1. Enlargement of the blind spot, generalised depression, and temporal wedge with a MD of -10.4 were detected in the left eye. Gonioscopic examination showed grade 4 open angles in both eyes. He was diagnosed with steroid-induced open angle glaucoma, and topical brimonidine twice daily was administered. After the first week of treatment, the IOP was reduced to 16 mm Hg in the right eye and 15 mm Hg in the left eye.

Incisional biopsies were performed under topical lidocaine anaesthesia to diagnose the conjunctival nodular lesions. The samples were stained with dye. Light microscopy examination of the haematoxylin and eosin-stained sections revealed adipocytes with increased congested vascular structures and plasma cell infiltration in fibrous tissue samples (Figure 2). There were no morphological signs of either vasculitis or amyloid. Atypical lipid tumour was diagnosed based on these findings.

Figure 2. Histological section of the lesion showing adipocytes, increase in congested vascular structures, and plasma cell infiltration (haematoxylin and eosin; original magnification, x 10).



The patient was followed up for approximately 20 months. The IOP remained controlled and there was no worsening of visual field defects and glaucomatous optic nerve damage during the follow-up period. Pain and irritation and enlargement of the conjunctival nodular lesions were not observed.

### Discussion

FMF is characterised by self-limiting recurrent attacks of fever and serositis and is caused by mutations in the pyrin gene.<sup>1-7</sup> The coexistence of this condition with PAN has been increasingly reported.<sup>1-3</sup> Various ocular pathologies, including episcleritis, anterior uveitis, panuveitis, retinal tear, and rhegmatogenous retinal detachment have been reported in FMF.<sup>3-7</sup>

Scharf et al reported episcleritis in 2 adults with FMF<sup>4</sup> and Yazici and Pazarli described episcleritis and anterior uveitis in a 28-year-old woman with FMF.<sup>5</sup> Panuveitis and episcleritis have been reported in siblings with FMF aged 7 and 11 years.<sup>6</sup> Recurrent bilateral panuveitis and rhegmatogenous retinal detachment have been reported in a 19-year-old patient with FMF.<sup>7</sup>

To the author's knowledge, there have been no previous reports of ocular findings in patients with coexisting FMF and PAN. This patient had multiple bilateral conjunctival nodular lesions, which were diagnosed as atypical conjunctival benign lipid tumour, with congested vascular structures and plasma cell infiltration into fibrous tissue samples. No amyloid material or vasculitis were found in the conjunctival lesions so it is likely that the conjunctival lesions were not part of the pathology of FMF and PAN.

This patient also had open angle glaucoma. The most likely cause of glaucoma was thought to be the long-term use of corticosteroids. He had used systemic corticosteroid for approximately 4 years until treatment was discontinued because of aseptic femur necrosis. He was then treated with colchicine and cyclosporine for

the previous 2 years. Another probable mechanism of his glaucoma was thought to be the blockage of trabecular outflow by amyloid material present in the tissues of patients with FMF. Future histopathological examination of the trabecular tissue is planned if trabeculectomy becomes necessary. It was also thought that a decrease in uveoscleral outflow due to the multiple conjunctival nodular lesions adherent to conjunctival and scleral tissues may be a cause of glaucoma. However, this patient may have had juvenile glaucoma, independently of FMF and PAN.

The unique feature of this patient was the unusual coexistence of FMF and PAN with conjunctival nodular lesions and glaucoma. This report emphasises the importance of detailed ophthalmological examination of patients with FMF and systemic vasculitic disorders for early diagnosis of glaucoma to prevent optic nerve damage.

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## Bloody Tears Caused by Ocular Leech Infestation

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*A leech, Limnatis, was identified on the ocular surface of a man who presented with profuse ocular surface bleeding after washing his face in a stream. The leech was extracted after instilling topical tetracaine 0.5%. The bleeding stopped 10 minutes after application of a pressure patch. Slit-lamp biomicroscopy revealed microperforation of the temporal bulbar conjunctiva with surrounding subconjunctival haemorrhage. Two days later, only a limited subconjunctival haemorrhage was apparent. Ocular leech infestation should be considered in the differential diagnosis of ocular surface bleeding or bloody tears, particularly for patients with a history of recent contact with water in a lake or stream.*

**Key words:** Eye hemorrhage, Leeches

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### Introduction

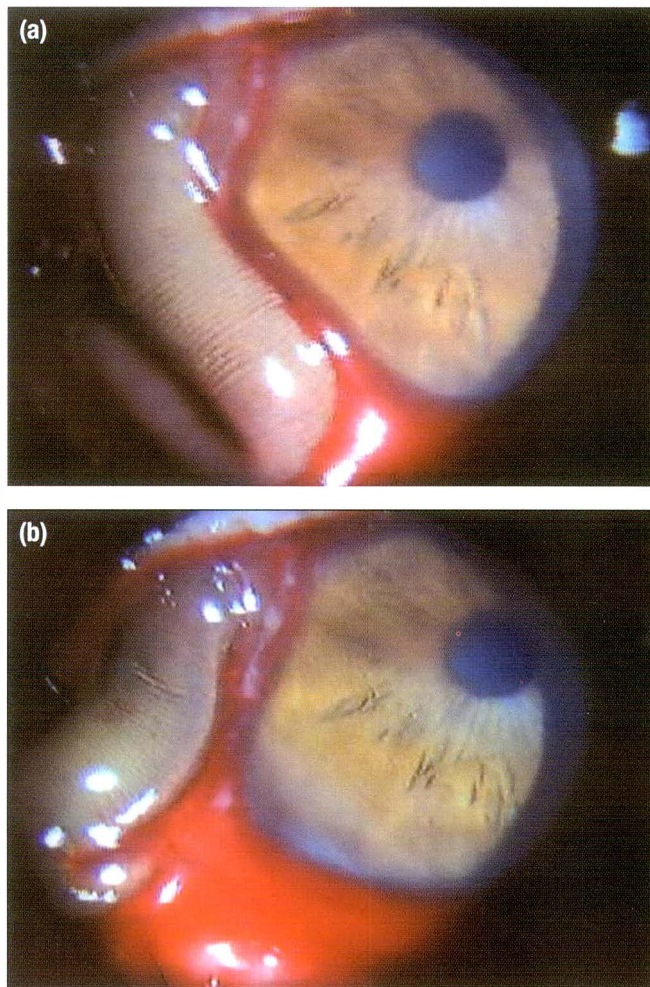
Leeches can adhere to mucosal surfaces such as the ocular surface,<sup>1,2</sup> nasal fossa,<sup>3</sup> nasopharynx,<sup>4</sup> oropharynx,<sup>5</sup> hypopharynx,<sup>6</sup> larynx,<sup>7</sup> vagina,<sup>8,9</sup> and rectum.<sup>10</sup> Adherence of a leech results in profuse epistaxis, haematemesis and/or haemoptysis, hoarseness and/or respiratory distress, menometrorrhagia, or rectorrhagia with resultant anaemia, which may be sufficiently severe to require blood transfusion. This report describes a man with ocular leech infestation from washing his face in a stream.

### Case Report

A 58-year-old man from a rural area presented to the Emergency Department of Shiraz Khalili Eye Hospital, Shiraz, Iran, in 2004 with copious ocular bleeding associated with ocular pain, foreign body sensation, and severe blepharospasm of 2 days' duration in his right eye. The patient's history showed that irritation had begun a few hours after he had washed his face in a stream. He had no history of trauma.

Biomicroscopy disclosed a green-brown mass more than 10 mm in length, which was found to be a blood-engorged leech lying on the ocular surface, attached to the temporal bulbar conjunctiva by its sucker. There was profuse bleeding from the conjunctival vessels, subconjunctival haemorrhage, conjunctival hyperaemia, and a few cells and mild flare in the anterior chamber. No signs of penetrating trauma were observed (Figure 1).

Figure 1. A leech on the ocular surface. (a) The leech lying on the ocular surface attached to the temporal limbus and bulbar conjunctiva; and (b) fresh bleeding and adjacent subconjunctival haemorrhage caused by the engorged leech.



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After instillation of topical anaesthetic drops (tetracaine 0.5%), forceps were used to extract the leech from the ocular surface. The bleeding stopped 10 minutes after application of a pressure patch, revealing a conjunctival microperforation posterior to the limbal palisades. Uncorrected visual acuity in the right eye was 20/40, which was compatible with the presence of an immature cataract. No other findings were detected on routine ophthalmic examination. The patient had no pertinent systemic symptoms or signs. The patient was administered topical chloramphenicol drops every 4 hours, betamethasone drops every 4 hours, and homatropine drops every 6 hours. By the second day after the extraction of the leech, the patient had only limited subconjunctival haemorrhage.

The parasitology department documented the alcohol-fixed specimen as a leech, *Limnatis*, based on the gross morphology and microscopic characteristics. The species of leech was not identified.

### **Discussion**

This report describes a rare case of ocular leech infestation presenting with profuse ocular surface bleeding. Alcelik et al reported that a leech adhered to the ocular surface in a child with a history of swimming in a stream and concluded that ocular leech infestation should be considered in the differential diagnosis of ocular trauma with iris prolapse, but no concomitant ocular surface bleeding was reported in this paper.<sup>1</sup> Auw-Haedrich et al reported ocular infestation with a duck leech in a girl who had bathed in a

flooded gravel pit.<sup>2</sup> She had presented with minor subconjunctival bleeding, but profuse bleeding did not occur.

These authors conclude that ocular leech infestation, although rare, might cause serious ocular surface bleeding. Attention should also be given to ocular leech infestation in the differential diagnosis of ocular surface bleeding or bloody tears, particularly when a history of swimming or face washing in a stream or lake is present.

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# Glaucoma Challenges in the Asia Pacific Region

From the 21st Congress of the Asia Pacific Academy of Ophthalmology held in Singapore, 10-14 June 2006

## Epidemiology of Glaucoma in China

Zhao Jia Liang  
China

Glaucoma is the most common irreversible blinding eye disease in China. However, there are few population-based studies of glaucoma prevalence in China. Epidemiological study of glaucoma has been conducted in Beijing in 1985 and 1996. The objective of the study was to estimate the prevalence of glaucoma and derive an estimate of the number of adults with glaucoma in China.

The location for the study was Shunyi District, which is a farming community northeast of Beijing. A random group of participants was enrolled through cluster sampling of villages. The participants received a basic eye examination and examinations to rule out glaucoma. The primary angle closure glaucoma (PACG) suspects underwent the following examinations. If the anterior chamber was shallow, gonioscopy was performed. If the anterior chamber angle was narrow, dark-room provocative test was performed. If the dark-room provocative test was positive, gonioscopy was performed in the dark room. If the anterior chamber angle was partially or totally closed, a diagnosis of PACG was made.

In this population, the prevalence of glaucoma was 2.07%. The prevalences of PACG, primary open angle glaucoma, and secondary glaucoma were 1.66%, 0.29%, and 0.12%, respectively (Table 1). The prevalence of glaucoma increased with age. Visual function was impaired to some degree in 64.0% of patients with glaucoma. The rate of bilateral blindness among patients with glaucoma was 16.0%, with all patients aged 60 years or older. The rates

Table 1. Prevalence of some types of glaucoma in China.

Glaucoma type	Prevalence
Primary angle closure glaucoma	1.66%
Primary open angle glaucoma	0.29%
Secondary glaucoma	0.12%

of unilateral blindness, bilateral low vision, and unilateral low vision were 17.0%, 23.0%, and 0%, respectively. This study confirms that glaucoma is a serious eye disease leading to blindness according to the prevalence and visual function of patients with glaucoma in China.

## Preventing Glaucoma Blindness — the Chinese Perspective

Ge Jian  
China

Glaucoma blindness remains one of the major public health challenges in China. Glaucoma, similar to other age-related diseases, will increase rapidly as the

population ages if no effective preventive and treatment actions are taken. However, the development of the eye care system is barely able to meet this enormous need.

There are an estimated 22,000 eye doctors currently practicing in China, with various levels of training and experience. Only an estimated 300 doctors are well-qualified glaucoma specialists. Growing epidemiological evidence suggests that the prevalence of primary open angle glaucoma (POAG) is at least comparable to the prevalence of angle closure.

It is challenging to screen, identify, and subsequently treat all patients with POAG in the community given that this disease is asymptomatic. This approach will require adequate clinical skills of doctors who can use appropriate technology, in combination with effective screening programmes. Therefore, the main focus of a national initiative to combat glaucoma blindness should be human resource development. Further

## Is Japanese Glaucoma Different?

Tetsuya Yamamoto  
Japan

This presentation showed what Japanese ophthalmologists think of glaucoma from epidemiological and pathogenetic viewpoints. According to the Tajimi Study, a population-based glaucoma survey, normal-tension glaucoma (NTG) is the most prevalent subtype of glaucoma in Japanese people aged 40 years or older, yielding a prevalence of 3.6%. The prevalence of NTG increases rapidly as the population ages, reaching 7.0% among people aged 70 years or older.

There are several intraocular pressure (IOP)-independent or vascular factors that are closely associated with NTG. Several studies have concluded that ocular hypotensive therapy is the treatment of choice for NTG, as well as for high-tension glaucoma. These conflicting findings must be carefully elucidated in the near future.

NTG is the most prevalent subtype of glaucoma in Japan. IOP-independent, probably vascular, factors as well as IOP are associated with the development and progression of NTG in this ethnic group.



training of ophthalmologists should be undertaken to ensure that eye care specialists are able to understand the appropriate basic techniques for glaucoma detection such as intraocular pressure measurement, gonioscopy, and optic disc examination. Health education campaigns will also help to improve the awareness of this condition among Chinese people.

### **Lessons from the Singapore 5-Fluorouracil Trial**

Steve Seah  
Singapore

The purpose of this trial was to determine the effects of a single 5-minute application of intraoperative 5-fluorouracil (5-FU) during glaucoma filtration surgery on intraocular pressure (IOP)-lowering; and field and optic disc progression in an Asian population.

This prospective randomised masked trial of intraoperative 5-FU 50 mg/mL versus placebo in trabeculectomy was performed among 243 Asian patients with primary glaucoma. Trabeculectomy was performed using a standard technique and patients were randomly assigned to intraoperative augmentation with 5-FU under the conjunctiva or placebo. The 2 primary outcomes of the trial were based on the Moorfields 5-FU Study criteria of post-operative IOP and progressive loss of visual fields and optic disc neuroretinal rim.

Three critical levels of IOP were used to define 3 types of 'IOP failure': post-operative IOPs of >14 mm Hg, >17 mm Hg, and >21 mm Hg at 2 consecutive visits (not including day 1). Modified Collaborative Normal-Tension Glaucoma Study criteria were used to determine visual field progression. Loss of optic disc neuroretinal rim was determined only after agreement by 2 masked observers of stereophotographs, comparing the baseline with those taken at each visit.

Intraoperative 5-FU significantly improved the long-term IOP-lowering effect of glaucoma surgery, without any significant increase in complications in this Asian population.

### **Glaucoma Prevalence in India — Urban Versus Rural**

Lingam Vijaya  
India

The purpose of this study was to determine the prevalence of primary glaucoma and the associated risk factors in an urban population compared with a rural population in southern India. Participants aged 40 years or older underwent a complete ophthalmic examination. Glaucoma was diagnosed according to the International Society of Geographical and Epidemiologic Ophthalmology classification. 3850 urban participants and 3924 rural participants were included in the study. The mean age of the urban population was significantly greater than that of the rural population (54.8 years [SD, 10.6 years] versus 53.8 years [SD, 10.6 years];  $p = 0.0001$ ). There were more people with diabetes and hypertension in the urban population than in the rural population. The mean intraocular pressure (IOP), central corneal thickness, and vertical cup-disc ratio was significantly greater for the urban population.

The prevalence of primary open angle glaucoma (POAG) in the rural population was 1.62% and was significantly different than 3.51% in the urban population ( $p=0.0001$ ). In both populations, POAG was positively associated with age and IOP. The number of people diagnosed to have POAG for the first time and blindness due to POAG was similar in both populations.

The prevalence of primary angle closure glaucoma (PACG) was similar in both populations. The prevalences of primary angle closure (PAC) and PAC suspect were significantly greater in the urban population. In both populations, PACG and PAC were positively associated with age and IOP. In the urban population, there was an association with diabetes and hyperopia. In the rural population, an association was seen with female sex. None of the rural participants with PACG were aware of the disease. In the urban population, 14.7% were aware of the disease (1 patient had had glaucoma surgery and 2 were diagnosed to have POAG). Blindness due to PACG was significantly greater in the urban population than in the rural population. The disease was asymptomatic in both populations.

In conclusion, the prevalence of POAG was greater in the urban population. The prevalence of PACG was similar in both populations. The detection rates were very poor in both populations.

### **Socioeconomic Considerations for Glaucoma Management in Developing Countries**

Manuel Agulto  
The Philippines

Glaucoma treatment aims to preserve vision and quality of life. The science of glaucoma management identifies the pharmacologic basis of drug choice, dosage, side effects, and improved therapeutic index. The art of glaucoma care involves the ability of patients to comply with a drug regimen to preserve visual acuity and visual field while maintaining quality of life. The socioeconomic limitations in developing countries compound the challenges in the control of glaucoma blindness. A clear grasp of the medical, social, and economic aspects of care will help minimise visual loss in the underserved and undertreated patients of the developing world.

***Glaucoma Challenges in Populations with Increasing Myopia***

*Wang Tsing-Hong  
Taiwan*

The prevalence rate of myopia is rising in Taiwan and the condition is a large public health problem in certain parts of the world, including East Asia. Although myopia progresses at a slower rate in adulthood than during childhood, myopia can still progress after puberty. Axial elongation of the eyeball is the main component that changes in myopic progression.

Adults with myopia are at greater risk for glaucoma. However, the associated ocular complications make the diagnosis and detection of progression of glaucoma difficult. Changes in the anterior segment including flatter corneal curvature, decreased corneal thickness, and endothelial density are noted as the eyeball elongates in myopia. These alterations may affect the accuracy of the measurement of intraocular pressure.

Higher risks for posterior subcapsular cataract, and cortical and nuclear cataract in patients with myopia have been reported in many epidemiological studies. Choriorretinal abnormalities such as retinal detachment, chorioretinal atrophy, and lacquer cracks also increased with the severity of myopia and greater axial length. The reliability of visual field examination for the detection and monitoring of progression of glaucoma is severely compromised under these circumstances. Myopic discs are more likely to have a wide range of size, variable

appearances, and other associated abnormalities. These characteristics markedly restrain the usefulness of imaging systems for optic nerve evaluation in glaucoma practice.

How to detect early glaucoma and monitor its progression in a highly myopic eye remains a serious and difficult issue. It is hoped that new technologies and research will cast more light in the future.

***Early Diagnosis — How Do We Find Glaucoma Before It Finds Us?***

*Paul Healey  
Australia*

Glaucoma is an important cause of preventable blindness. Symptomatic presentation occurs late and is associated with a poor prognosis. The long pre-symptomatic phase of glaucoma makes it amenable to screening. Despite this, diagnosis rates are generally poor. Recent statements in the USA and UK have recommended against screening, in part because of the poor predictive value of tonometry, poor reliability of visual field screening, and mild nature of the vision loss. The aim of this study was to evaluate glaucoma screening and diagnostic algorithms in a well-defined older Australian population.

The study group consisted of 3654 participants of the Blue Mountains Eye Study (BMES), aged 49 years or older, who were examined between 1992 and 1994. Goldmann applanation tonometry could be performed in 99% of participants, optic disc

photographs in 98%, and 76-point supra-threshold visual field testing in 89%. Open angle glaucoma (OAG) diagnosis required matching optic disc and full threshold (Humphrey 30-2) visual field appearance without regard to intraocular pressure (IOP). Subsequently, optic disc stereophotographs were assessed by trained masked non-clinician graders for optic disc signs reported to be associated with glaucoma.

The prevalence of OAG was 3.0% and increased exponentially with age. Age-standardised national projections predicted a 56% increase in the number of people with OAG over 15 years due to the ageing of the population. Sensitivity of current OAG screening methods in the BMES population was 50% with lowest sensitivities in younger participants. Current diagnostic algorithms had a positive predictive value (PPV), also of 50%, with a large proportion of false positives cases receiving glaucoma medications. The PPV of suprathereshold visual field screening and IOP >21 mm Hg for OAG diagnosis was 15%. Multivariate analysis showed that a combination of systemic, ocular, and optic disc signs had the best sensitivity and specificity for OAG detection. A simplified empirical scoring system was devised based on this model. Using a conservative cut-off, the scoring system would screen 4.5% of the population older than 50 years as positive, with a sensitivity of 90% and a positive predictive value of 56%. These are the best diagnostic test results reported for OAG. In conclusion, screening for OAG may be more feasible than previously thought.



South East Asia Glaucoma Interest Group

SEAGIG CHENNAI - 2006 INTERNATIONAL GLAUCOMA CONVENTION Dec 1-3, 2006

# Fourth Scientific Meeting of the South East Asia Glaucoma Interest Group

The Fourth Scientific Meeting of the South East Asia Glaucoma Interest Group (SEAGIG) is to be held conjointly with the Glaucoma Society of India in Chennai, India, on 1 to 3 December 2006.

The previous conferences in Bangkok, Manila, and Kuala Lumpur were great successes, with registrants reporting themselves enriched professionally and personally by the stimulating programmes assembled by the organising committees. All of this has been achieved in a warm and welcoming atmosphere, with an enjoyable social programme and ample opportunity to view posters and to take advantage of extensive industry exhibitions set up by supportive sponsors.

The approach to the management of glaucoma has recently undergone much change. The profile of this disease has an additional spectrum that is peculiar to this region of the world and there is a continuous need to update knowledge and information of glaucoma. Meetings and the exchange of ideas are important aspects of this process and SEAGIG CHENNAI 2006 is one such important event. SEAGIG CHENNAI 2006 will provide an excellent opportunity to gather together and continue the efforts to improve

regional knowledge of the science of glaucoma.

Programme highlights include the following:

- angle closure glaucoma
- evidence-based ophthalmology
- controversies in glaucoma
- diagnostics
- video surgery session
- paediatric glaucoma and secondary glaucoma
- patient management beyond randomised controlled trials
- instruction courses.

SEAGIG CHENNAI 2006 will be hosted by Sankara Nethralaya under the aegis of the Glaucoma Society of India and will

be held at the Chennai Convention Center, CTC Complex, Nandambakkam, Chennai, Chennai 600 089, Tamil Nadu, India. For further information, please contact:

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## SEAGIG Membership

Membership of SEAGIG entitles an ophthalmologist to a discounted registration at SEAGIG meetings, access to the Asia Pacific Glaucoma Guidelines downloadable from the website and access to an electronic version of Asian Journal of Ophthalmology. SEAGIG is also offering a free 12-month online membership.

Join and be part of this growing family of ophthalmologists in the Asian region, committed to excellence in glaucoma patient care by continuing professional development and to collaborative research and teaching. Join us in Chennai for what promises to be another first-class scientific and social conference.



See you in Singapore in 2007!  
2nd March - 5th March 2007

Asia-ARVO (Association for Research in Vision and Ophthalmology) is a biennial meeting held in locations throughout Asia to highlight the important clinical and translational aspects of vision and ophthalmic research. Previously known as SERI-ARVO for meetings held in 2003 and 2005, the name was changed in 2005 to reflect ARVO's commitment to partnering with the many countries in Asia that have expanding eye research programmes.

### Singapore Eye Research Institute

Asia-ARVO is hosted by the Singapore Eye Research Institute (SERI), the national research institute of ophthalmology funded by the National Medical Research Council. SERI is dedicated to performing vision research with local institutions as well as major eye centres and research institutes throughout the world. Since its inception in 1997, SERI has established itself as a leading centre in South Asia for eye and visual science research and educational programmes. In 2003, SERI was appointed as a National University of Singapore-affiliated institute. With its close integration of clinical, basic science, and epidemiological research, SERI is a premier eye research centre in Southeast Asia.

*"The mission of SERI is to advance knowledge in the fields of ophthalmology and the visual sciences with the aim of reducing the scourge of blindness and poor sight."*

### Association for Research in Vision and Ophthalmology

ARVO is the world's largest organisation of vision and ophthalmology researchers, with more than 11,500 clinicians from more than 70 countries.

ARVO's membership continues to grow, with 14% membership in 11 countries in Asia, 58% in the USA, and 28% in the remaining 58 membership countries. The membership is multidisciplinary and consists of both clinical and basic science researchers. Considered the premier eye research meeting, ARVO's Annual Meeting in Florida attracts more than 10,200 researchers from around the world.

*"The mission of the Association for Research in Vision and Ophthalmology is to serve as a global forum for dissemination and exchange of information about vision research, to meet the needs of vision scientists, and to be an advocate for vision science in order to facilitate the advancement of vision research and the prevention and cure of disorders of the visual system worldwide."*

#### Important Dates

15 Aug 2006 — Online abstract submission opens at [www.seri.com.sg](http://www.seri.com.sg)

30 Sep 2006 — Online abstract submission closes

#### Host Institute

Singapore Eye Research Institute

#### Supported by

Association for Research in Vision and Ophthalmology

#### Participating Institutes

Alexander Hospital, Department of Ophthalmology

Changi General Hospital, Department of Ophthalmology

National University of Singapore, Department of Community, Occupational and Family Medicine

National University of Singapore, Department of Ophthalmology

Singapore General Hospital, Department of Endocrinology

Singapore National Eye Centre

Singapore Polytechnic, School of Optometry

Tan Tock Seng Hospital, Department of Ophthalmology

Asia-ARVO will be held at Suntec Singapore, Singapore, from 2-5 March 2007.

For further information, visit the website at: [www.seri.com.sg](http://www.seri.com.sg)

See you in Singapore in 2007!

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## SEAGIG JOINS ICO/IFOS



The South East Asia Glaucoma Interest Group (SEAGIG) is pleased to announce that the International Council of Ophthalmology (ICO) has approved SEAGIG's application to join the International Federation of Ophthalmological Societies (IFOS).

IFOS represents and serves professional associations of ophthalmologists throughout the world; ICO is the executive body and operational arm of the IFOS. ICO/IFOS is dedicated to preserving and restoring vision for all people worldwide and to serving the current and future needs of ophthalmologists and the public.

Until recently, IFOS voting membership had been limited to the primary national ophthalmological society in each country. In October 2004, IFOS voted to expand in recognition of the critical role that subspecialty societies play in ophthalmology. At its February 2006 meeting in São Paulo, Brazil, the ICO approved the applications of 17 international subspecialty societies and related groups to join IFOS, of which SEAGIG was the first group to be granted membership.

For further information about IFOS, visit the website at:

[www.icoph.org](http://www.icoph.org)

For information about ICO programmes, initiatives, and services, visit the website at:

[www.icoph.org/ic/programs.html](http://www.icoph.org/ic/programs.html) and [www.icoph.org/ic/moreprog.html](http://www.icoph.org/ic/moreprog.html)

For reports on the IFOS General Assembly in Sao Paulo, visit the website at:

[www.icoph.org/news/sao2.html#members](http://www.icoph.org/news/sao2.html#members)

# 5th International Retina Angiograph Symposium

*3 to 5 November, Kyoto, Japan*

Heidelberg Engineering, the leading developer of laser diagnostics for ophthalmic applications, celebrates the fifth anniversary of its well-established International Retina Angiograph Symposium.

After successful meetings in China, the USA, Italy, and Germany, the fifth symposium will take place in Kyoto, Japan and, for the second time in its history, chooses the Asian continent as a spectacular venue.

This year's course director Professor Yasuo Tano, who is President of the Japanese Ophthalmology Society and President of the Asia-Pacific Academy of Ophthalmology, again invites Heidelberg retinal angiography experts, users, and interested parties to a lively exchange of ideas. The lecturers include Professor Frank Holz from Bonn, Germany, and Professor Giovanni Staurenghi from Milan, Italy, as well as speakers from Japan, China, and Singapore, who will present their views

on interesting laser scanning angiography topics.

In addition, Heidelberg Engineering will give participants the opportunity to discuss individual clinical cases and provide an outlook of the latest developments in the company's product portfolio.

For further information or registration please contact:

Tel: (49 6221) 646 3306

E-mail: [Academy@HeidelbergEngineering.com](mailto:Academy@HeidelbergEngineering.com)

## **Aravind Eye Care System — Website Launched**

Aravind, with the support from the International Eye Foundation, has developed Vision 2020 e-resource, a web-based resource centre for eye care management worldwide.

Vision 2020 e-resource is a unique, comprehensive collection of electronic resources for the management of eye care. The website aims to share knowledge and provide resources at first hand, and to conceptualise all the elements relevant to eye care delivery for the development and implementation of efficient and sustainable eye care programmes targeting people in developing countries.

The website was launched on 7 April 2006, World Health Day. To date, there are more than 2000 registered members from 130 countries throughout the world. The features of the website are as follows:

- advanced search engine — to guide the retrieval of specific materials
- abstract and guideline downloading facility for all materials and powerpoint broadcast for specific materials

- extensive Events calendar and Discussion forum
- SiteNews — a monthly E-newsletter providing updates and developments on the website.

### **Who Will Benefit?**

As Vision 2020 e-resource mainly concentrates on the management side of eye care, it will primarily be beneficial to:

- administrators
- ophthalmologists
- optometrists
- ophthalmic assistants
- opticians
- heads of eye hospitals
- managers
- counsellors
- community outreach workers
- postgraduate students.

The full materials can be accessed only on registration. There is no registration fee. The website can be accessed at: [www.v2020eresource.org](http://www.v2020eresource.org)

To access the registration page directly, click on the following link:

[www.laico.org/v2020resource/new\\_member\\_registration.asp](http://www.laico.org/v2020resource/new_member_registration.asp)

Contributions and suggestions are welcomed in the form of:

- suggestions and feedback
- rating the products
- eye care resource materials to be uploaded onto the site
- links to eye care websites that have been effective.

For further information, please contact:  
Vision 2020 e-resource Team  
Lions Aravind Institute of Community Ophthalmology  
1, Annanagar  
Madurai - 625 020  
Tamil Nadu  
India  
E-mail: [eyesite@aravind.org](mailto:eyesite@aravind.org) or [info@aravind.org](mailto:info@aravind.org)  
Website: [www.v2020eresource.org](http://www.v2020eresource.org)



# SEAGIG

South East Asia Glaucoma Interest Group

## SEAGIG - CHENNAI 2006

Under the aegis of



GLAUCOMA  
SOCIETY  
OF INDIA

INTERNATIONAL  
GLAUCOMA CONVENTION  
DECEMBER 1-3, 2006, CHENNAI, INDIA.

Hosted by



### Venue :

Chennai Convention Centre  
CTC Complex, Nandambakkam,  
Chennai - 600 089

### FOR MORE INFORMATION PLEASE CONTACT

#### Dr L .Vijaya

Organizing Chairperson, SEAGIG - CHENNAI 2006

Director, Glaucoma Services

**SANKARA NETHRALAYA**

18 College Road, Chennai 600 006, India

Tel: (91 44) 2827 1616 / 2823 3556 Fax: (91 44) 2825 4180

E-mail: [drlv@snmail.org](mailto:drlv@snmail.org) ; [seagig\\_2006@yahoo.com](mailto:seagig_2006@yahoo.com)

### Programme Highlights

#### Symposia and Sessions on:

- Angle Closure Glaucoma
- Evidence Based Ophthalmology
- Controversies in Glaucoma
- Diagnostics
- Video Surgery Session
- Pediatric Glaucoma and Secondary Glaucoma
- Patient Management beyond the RCT's
- Instruction Courses

How to write a paper

Angle Evaluation

Disc & Field Assessment

Imaging Techniques

### Faculty

We have a stellar cast of glaucoma experts who will share their experiences with us.

#### Confirmed International Faculty:

Alan Robin	USA	Marlene Moster	USA
Andre Mermoud	SWITZERLAND	Ming Guang He	CHINA
Aung Tin	SINGAPORE	Paul Foster	UNITED KINGDOM
Clement C Y Tham	HONG KONG	Paul TK Chew	SINGAPORE
Deepak Edward	USA	Paul Palmberg	USA
Ho Ching Lin	SINGAPORE	Prin Rojana Pongpun	THAILAND
Ivan Goldberg	AUSTRALIA	Robert Ritch	USA
Jimmy Lai	HONG KONG	Seng Kheong Fang	MALAYSIA
Jost Jonas	GERMANY	Ted Krupin	USA
Kuldev Singh	USA	Vincent Michael Patella	USA
Lu Da Wen	TAIWAN	Yoshiaki Kitazawa	JAPAN

#### Glaucoma Experts from India



Registration can be done online at [www.seagigchennai.org](http://www.seagigchennai.org)

### Abstract Submission

We invite abstracts for poster and free paper presentations. Important dates in this regard are:

**15th June 2006** :Abstract submission opens

**15th August 2006** :Abstract submission closes

Abstract submission can be done online at  
[www.seagigchennai.org](http://www.seagigchennai.org)

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**September 2006**

**20-23**

**12th International Conference on Beçhet's Disease**

**Lisbon, Portugal**

Contact: Cristina Vicente

Tel: (351 217) 120 778

Fax: (351 217) 120 204

E-mail: cristinavicente@veranatura.pt

**October 2006**

**12-13**

**Centre for Eye Research Australia 10th Anniversary Conference**

**Melbourne, Australia**

Contact: Kelly Mallia

Tel: (61 399) 298 705

Fax: (61 399) 298 423

E-mail: kmallia@unimelb.edu.au

**12-13**

**Glaucoma Meeting Basel — Fundamental Sciences in Glaucoma**

**Basel, Switzerland**

Contact: Daniela Hauenstein

Tel: (41 612) 658 718

Fax: (41 612) 658 652

E-mail: info@glaucoma-meeting.ch

**November 2006**

**3-4**

**21st Annual Clinical and Scientific Meeting of the Neuro-Ophthalmology Society of Australia**

**Sydney, Australia**

Contact: Mark Paine

E-mail: markpaine@ozemail.com.au or michael@icn.usyd.edu.au

**3-5**

**5th International Retina Angiograph Symposium**

**Kyoto, Japan**

Contact: Congress Secretariat

Tel: (49 6221) 646 3306

E-mail: Academy@HeidelbergEngineering.com

**11-14**

**2006 American Academy of Ophthalmology's Joint Meeting with the Asia Pacific Academy of Ophthalmology**

**Las Vegas, USA**

Contact: American Academy of Ophthalmology

Tel: (1 415) 561 8500

Fax: (1 415) 561 8533

E-mail: meetings@aao.org

**December 2006**

**1-3**

**SEAGIG 2006 Meeting of the South East Asia Glaucoma Interest Group/Asian Oceanian Glaucoma Society and the Glaucoma Society of India**

**Chennai, India**

Contact: Dr L Vijaya

Tel: (91 44) 2827 1616

Fax: (91 44) 2825 4180

E-mail: seagig\_2006@yahoo.com or drlv@snmail.org

**February 2007**

**1-4**

**65th Annual Meeting of the All India Ophthalmological Society**

**Hyderabad, India**

Contact: Dr Pradeep Swarup

E-mail: pswarup@satyam.net.in

Website: www.sunayana2007.org

**Note to Readers**

This section is intended to highlight activities of interest to glaucoma specialists and ophthalmologists in Asia. Please let us know of any forthcoming activities that you may be organising or wish to feature on this section.

**24-28**

**22nd Congress of Asia Pacific Academy of Ophthalmology**

**Lahore, Pakistan**

Contact: Congress Secretariat

E-mail: secretariat@apao2007.com or

info@apao2007.com

Website: www.apao2007.com

**March 2007**

**2-5 March**

**Asia ARVO**

**Singapore**

Contact: Karen Chee

Tel: (65) 6322 8311

Fax: (65) 6323 1903

E-mail: karen.chee.s.l@seri.com.sg

Website: www.seri.com.sg

**28-31**

**6th International Glaucoma Symposium**

**Athens, Greece**

Contact: Avital Rosen

Tel: (41 229) 080 488

Fax: (41 227) 322 850

E-mail: glaucoma@kenes.com

**April 2007**

**28-2 May**

**2007 Annual Symposium and Congress of the American Society of Cataract and Refractive Surgery**

**San Diego, CA, USA**

Contact: ASCRS-ASOA

Tel: (1 703) 591 2220

Fax: (1 703) 591 0614

E-mail: ascrs@ascrs.org/asoaa@asoaa.org

**June 2007**

**9-12**

**2007 Congress of the European Society of Ophthalmology**

**Vienna, Austria**

Contact: Britta Sjöblom

Tel: (46 84) 596 650

Fax: (46 86) 619 125

E-mail: britta.sjoblom@congrex.se

**Phaco Training and ICO Fellowships**

Mahatme Eye Bank & Eye Hospital, Nagpur, India, offers training programmes for ophthalmologists, as follows:

1. Three-month International Council of Ophthalmology fellowship in phaco.
2. Two-week hands-on phaco training.
3. Thirteen-month fellowship postgraduation.
4. Postgraduate courses in ophthalmology.
5. International Council of Ophthalmology examination assessment centre.

This training is available throughout the year. For further information, please contact:

**Dr Vikas Mahatme, Mahatme Eye Bank & Eye Hospital, 16 Central Excise Colony, Ring Road, Nagpur-440015, India.**

Tel: (91 712) 223 4345/222 2556

Fax: (91 712) 224 2202

E-mail: contact@mahatmehospital.com

Website: www.mahatmehospital.com



## Australian Experience with Selective Laser Trabeculoplasty



*Ivan Goldberg  
Eye Associates  
Sydney Eye Hospital & the  
University of Sydney  
Sydney, Australia*

Selective laser trabeculoplasty (SLT) offers benefits over Argon laser trabeculoplasty (ALT), producing similar results but with fewer complications. ALT is often used for patients with glaucoma who are unable to tolerate medical therapy or who are not at target intraocular pressure (IOP) levels despite maximal tolerable medical therapy. The limitations of ALT include the risk of short-term or prolonged rise in IOP, the potential for peripheral anterior synechiae (PAS), limited efficacy with retreatment, and

coagulative damage to the trabecular meshwork (TM).

Developed as an alternative to ALT, SLT such as the Ellex Tango™ SLT/YAG laser system uses a Q-switched laser with a 3-nanosecond pulse, and a frequency-doubled neodymium:YAG laser with 532 nm wavelength. SLT selectively targets the melanin-rich cells of the TM using a short pulse duration and low laser energy; it is non-thermal as the short pulse duration is below the thermal relaxation time of the TM tissue, and is repeatable.

Prof Goldberg described a retrospective chart review of 389 eyes of 271 patients with IOPs greater than the target level despite maximal medical therapy. The technique is shown in Table 1. The mean IOP was reduced from 21 mm Hg to 16 mm Hg, which was maintained

**Table 1. Treatment with selective laser trabeculoplasty.**

- Pretreatment with apraclonidine and pilocarpine 2%
- Topical anaesthetic
- Goldmann-style lens/no magnification
- Adjacent applications — approximately 50 to 80 per 180°
- Power 0.4 -1.6 mJ
- Trabecular meshwork pigment influences energy setting — more pigment = less energy
- Adjusted until 'champagne bubbles' just present
- 2 x 180° treatments ~1 week apart

at 39 months. The average decrease was 23.8%. Prior to SLT, the average number of antiglaucoma medications was 2.2, which decreased to 1.9 after treatment; 67 patients required fewer medications. Only 4 patients (1.5%) had an IOP spike, all of which were <5 mm Hg.

SLT provides an alternative to ALT or filtering surgery for patients taking maximal tolerable medical therapy. SLT can be considered as first-line therapy in some circumstances, or as an adjunct to other treatments.

## Clinical Experience with Selective Laser Trabeculoplasty in Japan



*Yasuaki Kuwayama  
Osaka Koseinenkin Hospital  
Osaka  
Japan*

Whether the first-line treatment for glaucoma should be medical or laser is a continuing debate among glaucoma specialists. The Glaucoma Laser Trial found that ALT was almost as effective as medication for first-line therapy. Although ALT produces good results, there is a waning effect with a gradual increase in IOP over time. Repeat application of ALT is not effective due to coagulative injury and may result in a sustained paradoxical IOP elevation. On the other hand, SLT preserves the architecture of the TM.

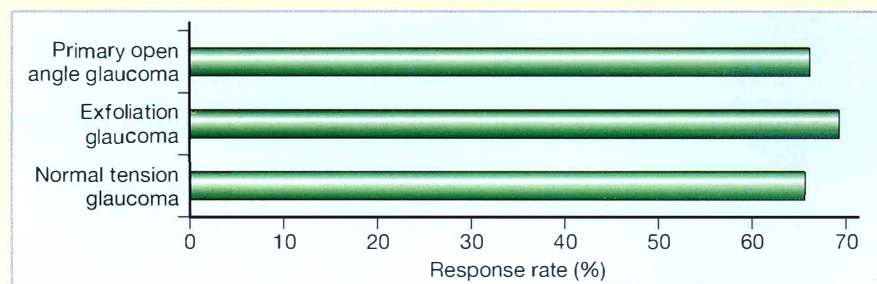
Dr Kuwayama described a trial of SLT performed in 210 eyes of 210 consecutive patients.

Prior to treatment, the mean IOP was 20.7 mm Hg (SD, 4.4 mm Hg) and the mean number of medications was 2.0 (SD, 0.9). Adjacent laser spots were placed on the lower 180° of the TM. Although there was an IOP spike 1 hour after treatment without apraclonidine, the IOP subsequently decreased by approximately 4 mm Hg. The percent IOP reduction was approximately 20% ( $p < 0.01$ ), with 62.7% of patients achieving an IOP decrease of  $\geq 20\%$ .

Figure 1 shows the response rate for different types of glaucoma.

A further study was performed to compare SLT 180° with 360° in 90 patients with IOPs  $\geq 15$  mm Hg. Both 180° and 360° treatment significantly reduced the IOP compared with baseline ( $p < 0.05$ ). However, the magnitude of the IOP reduction was greater with 360° (3.7 mm Hg versus 2.4 mm Hg). Fifty two percent of patients receiving 180° had an IOP reduction  $>10\%$  compared with 75% of patients receiving 360°. SLT is an effective treatment for most patients, with comparable results to ALT, prostaglandins, and  $\beta$ -blockers. SLT may therefore be appropriate as first-line therapy.

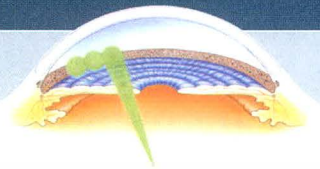
**Figure 1. Response rate to selective laser trabeculotomy by glaucoma type.**





# SLT. NATURALLY RESTORE MESHWORK.

## SELECTIVE LASER TRABECULOPLASTY



Manage glaucoma more effectively with SLT from Ellex. This advanced, non-thermal procedure restores the function of the trabecular meshwork by using short pulses of low-energy light to target the melanin in specific cells of the affected eye. In response, the body's natural healing mechanisms rebuild these cells, improving drainage and lowering intraocular pressure. Gentle and non-invasive, SLT is a proven primary or adjunct treatment that produces no burn, scar tissue or other side effects, and can be repeated as needed.

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# Clinical Results of Selective Laser Trabeculoplasty in Korea



*Jung-II Moon  
Glaucoma Services  
Catholic Eye Center  
The Catholic University of  
Korea*

Until recently, laser, surgery, and medical therapies have all been used as first-line treatment for patients with primary open angle glaucoma (POAG) in Korea. However, this situation changed with the introduction of newer, more effective, antiglaucoma medications and surgical techniques, resulting in reduced use of laser surgery. ALT is the most widely used laser treatment in Korea, but the recent introduction of SLT has generated interest among glaucoma specialists. Dr Moon described a study to ascertain whether SLT may be a substitute for ALT in Korean patients with POAG or ocular hypertension (OH) based

on outcomes of IOP reduction, medical dependency, and complications. Patients received either ALT or SLT, and there were no significant differences in the characteristics of each treatment group. IOP was assessed 1 hour, 1 day, 1 week, and 1, 3, and 6 months after treatment. The IOPs after therapy were not significantly different between the 2 groups (Table 2) and there were no significant differences in the mean IOP reduction. The criteria for successful

treatment were defined as an IOP reduction  $>3$  mm Hg or  $\geq 20\%$  reduction from baseline. SLT resulted in a 79% success rate compared with 70% for ALT. Patients in both groups were able to reduce the number of medications after treatment, and there was no difference between the 2 groups. However, more patients receiving ALT experienced complications. Both SLT and ALT were similarly effective for lowering IOP in patients with POAG or OH. Importantly, SLT resulted in a lower incidence of complications such as inflammation, transient IOP increase, or PAS formation. Moreover, SLT was better tolerated and resulted in less discomfort during treatment than ALT.

**Table 2. Change in intraocular pressure following selective laser trabeculoplasty and argon laser trabeculoplasty.**

	Selective laser trabeculoplasty (SD)	Argon laser trabeculoplasty (SD)	p Value
Pretreatment	25.0 (6.9)	24.7 (5.7)	0.69
1 day	18.8 (5.8)	18.4 (4.9)	0.54
1 week	14.1 (5.9)	14.6 (5.6)	0.41
1 month	15.7 (6.1)	16.2 (4.5)	0.49
3 months	17.8 (6.7)	16.9 (5.1)	0.54
6 months	16.9 (4.2)	17.9 (5.4)	0.62

# Selective Laser Trabeculoplasty for Primary Angle Closure Glaucoma



*Amy Chow  
Tuen Mun Hospital  
Tuen Mun  
Hong Kong*

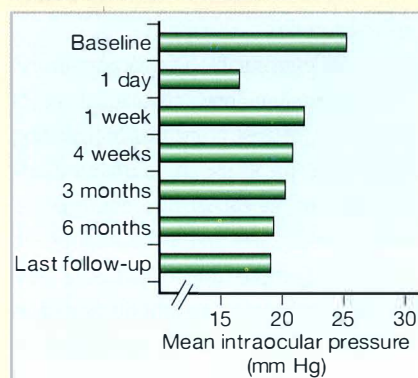
A prospective observational non-comparative study performed to determine whether SLT is effective in lowering IOP in 13 eyes of 12 Chinese patients with primary angle closure glaucoma (PACG) was described by Dr Chow.

Brimonidine was given 15 minutes before the procedure, which was performed under topical anaesthesia using the Latina lens. Approximately 50 spots were placed for 90° to 180° of the TM. The initial laser power was set to 0.6 mJ and increased in 0.1 mJ increments until 'champagne bubbles' appeared. Topical predni-

solone was given for 1 week after the procedure. Follow-up was scheduled for 1 day, 1 week, and 1, 3, and 6 months after treatment. A second laser treatment was done after 2 to 6 weeks if

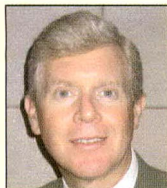
the IOP returned to the pretreatment level. The mean follow-up period was 9.1 months. At day 1, there was a significant reduction in mean IOP ( $p < 0.001$ ). There was an increase in IOP after 1 week, followed by a gradual decrease (Figure 2). Five eyes required additional medications to control the IOP, 1 of which underwent repeat SLT and 1 received phacotrabeculectomy; a further 3 eyes required repeat SLT. Of the 4 eyes that underwent a second procedure, the resulting IOPs were  $< 21$  mm Hg without additional medications. One eye required fewer medications after the procedure. In terms of complications, there was no severe anterior chamber inflammation and no increase in the extent of PAS closure. SLT significantly lowered IOP in patients with PACG without requiring a significant increase in the number of antiglaucoma medications required.

**Figure 2. Mean intraocular pressure following treatment of primary angle closure glaucoma with selective laser trabeculoplasty.**



*From the Ellex satellite symposium SLT Clinical Practices in the Asia Pacific held at the 21st Congress of the Asia-Pacific Academy of Ophthalmology, Singapore, 11 June 2006.*

## Newer Strategies for Prevention of Pseudophakic Endophthalmitis



Dr Terrence P O'Brien  
Professor of Ophthalmology  
Bascom Palmer Eye Institute  
University of Miami  
Florida  
USA

Endophthalmitis is potentially sight-threatening and among the most important complications of ocular surgery. The investigation of endophthalmitis has proved troublesome. Perhaps because of its relatively low incidence, most literature reports on endophthalmitis have been retrospective in nature, and controlled studies are rare due to the variety of procedures used in cataract surgery. Furthermore, laboratory methods often fail to positively identify causative organism(s) in the disease.

### Role of Periocular Flora

Periocular flora play a definite role in endophthalmitis; organisms present in the aqueous and vitreous humor in cases of endophthalmitis have been confirmed as having the same molecular identities as the patients' own flora.<sup>1</sup> The great majority of cases of endophthalmitis appear to be caused by gram-positive ocular pathogens.<sup>2</sup>

Despite the many technological advances in surgical techniques, culture of the anterior chamber fluid at the conclusion of cataract surgery (even modern small incision procedures) has revealed high rates of intraoperative bacterial contamination rates ranging from approximately 4% to 40%. Recent trends toward the use of topical anaesthesia and clear or near-clear corneal incisions in cataract surgery are thought to be related to a rise in the prevalence of postoperative endophthalmitis.

Research using India ink particles as a surrogate for periocular bacteria has shown that particles travel from the corneal surface into all incisions. Variation in intraocular pressure causes gaping of corneal incisions, and influx of surface fluid into the anterior chamber

during episodes of hypotony results in 'inoculation' after surgery.<sup>3,4</sup> Although scleral tunnel incision techniques also have the potential for infection via this mechanism, there was a significant 2.8-fold greater risk of endophthalmitis with clear corneal versus scleral tunnel incisions.<sup>5</sup>

While the extent of the problem remains debatable, it appears that the incidence of postsurgical endophthalmitis has increased in the past decade. Thus, health insurance claims data from the USA show a significant rise in endophthalmitis between 1994 and 1997 and 1998 and 2001.<sup>6</sup>

### Methods to Reduce Infection

The well-established method for reducing preoperative ocular surface flora is use of povidone-iodine, and this has been shown to significantly reduce endophthalmitis.<sup>7</sup> Povidone-iodine can be applied to the skin in a 10% solution, with a 5% solution applied directly to the ocular surface. The use of a combination of 5% povidone-iodine and an appropriate topical antibiotic is more effective than either agent alone, increasing the clearance rate of bacterial contamination of the conjunctiva and ocular surface from about 90.0% to 99.9%. The ideal properties of an antibiotic for use in such a combination can be summarised in 4 'b's as follows:

- broad spectrum
- bactericidal
- biocompatible (non-cytotoxic, immunomodulatory)
- bioavailable (favourable pharmacodynamics).

The fluoroquinolone antibacterial agents possess many of these properties, contributing to their widespread use in ophthalmic surgery. Many of the earlier fluoroquinolones such as ciprofloxacin and levofloxacin have compromised efficacy due to increasing rates of bacterial resistance. The introduction of an 8-methoxy group to the fluoroquinolone nucleus led to the development of fourth-

generation or methoxyfluoroquinolones, such as gatifloxacin and moxifloxacin (Figure 1). These agents, with expanded antibacterial activity against gram-positive organisms such as *Staphylococcus aureus* (including methicillin-resistant strains), streptococci, and enterococci, are highly effective in eliminating pathogens responsible for endophthalmitis.

The greater efficacy of the fourth-generation agents against conjunctival isolates compared with older fluoroquinolones such as ciprofloxacin and ofloxacin has been demonstrated by microbial sensitivity testing in a study of 93 clinical isolates from patients with endophthalmitis.<sup>8</sup>

### Role of Preservative

Commercially available gatifloxacin eye-drops contain the preservative benzalkonium chloride (BAK) 0.005%. The use of this preservative in ophthalmic anti-infective solutions has several possible advantages:

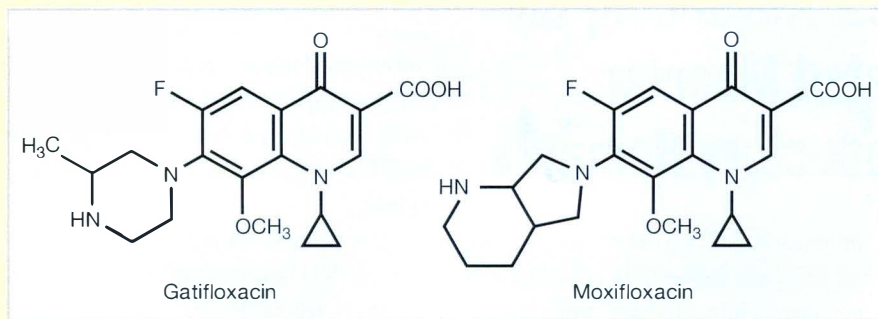
- provides antimicrobial activity against bacteria and fungi within the bottle
- prevents decomposition of active drug
- can enhance tissue absorption of the drug
- can enhance the magnitude and speed of microbial killing.

The possibility of ocular toxicity is a concern, but does not seem to be clinically relevant with short-term use at low concentrations.

There is some preliminary evidence that the proprietary combination of gatifloxacin and BAK is more effective than gatifloxacin alone in vitro against common conjunctival isolates. Minimum inhibitory concentrations (MICs) in the presence of BAK in the concentrations found in Zymar (50 ppm; gatifloxacin; Allergan) were substantially lower than the MICs for gatifloxacin alone.<sup>9</sup> Comparisons of MICs for antibiotics alone may thus be misleading and may not always represent the marketed formulation's ability to inhibit growth.

Compared with a proprietary preparation of moxifloxacin against several strains of *Staphylococcus*, we found that Zymar had the more rapid kill curve.<sup>10</sup> A faster bacterial kill on the ocular surface might be beneficial in the

**Figure 1. Chemical structures of the methoxyfluoroquinolones gatifloxacin and moxifloxacin.**



clinical setting, e.g., when the preparation is administered a short time before surgery.

## Eradication of Organisms Entering the Eye

Eradication of bacteria that do enter the eye during surgery requires a sustained intraocular concentration of antibiotic. The antibiotic can be administered by various methods, for example, subconjunctival injection, administration via the infusion fluid, systemic administration, or topical administration. For the typical patient, frequent topical administration of the appropriate drug should allow protective concentrations to be achieved in the anterior chamber.

The new-generation fluoroquinolones penetrate the corneal epithelial barrier better than their predecessors.<sup>11</sup> In rabbits receiving a huge inoculum of *S aureus*, topical administration of a methoxyfluoroquinolone prevented endophthalmitis, whereas control eyes developed severe endophthalmitis.<sup>12</sup>

The large European Society of Cataract and Refractive Surgery Study has recently demonstrated the benefits of intracameral antibiotic (cefuroxime 1 mg) in preventing endophthalmitis in patients undergoing

phacoemulsification/intraocular lens implantation.<sup>13</sup> The known properties of gatifloxacin such as its speed of kill and wide bacterial coverage suggest that the drug could be a more appropriate choice than the cephalosporin for intracameral administration.

## Conclusions

Pseudophakic endophthalmitis appears to be on the rise in association with cataract surgeries. Intraocular pressure variation, especially after clear corneal surgery ('self-sealing' incisions) can cause the internal aspect of incisions to gape, and allow surface fluid to travel along the incision, resulting in inoculation of the anterior chamber during the postoperative period. Preferred practice guidelines for prevention are summarised in Table 1. For postoperative prophylaxis, high-dose, short-term topical antibiotic therapy should be used, e.g., gatifloxacin or moxifloxacin 6 to 8 times a day for the first 24 to 48 hours, and then 4 times daily for 7 to 10 days.

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*From the Allergan Asia Pacific satellite symposium Challenges and Progress in the Treatment and Prevention of Ocular Infection held at the 21st Congress of the Asia-Pacific Academy of Ophthalmology, Singapore, 12 June 2006.*

**Table 1. Preferred practice for prevention of endophthalmitis in cataract surgery.**

- Follow careful aseptic technique
- Lid/lash preparation
- Adhesive drape plus speculum
- Prepare ocular surface to reduce potential contamination
- Antiseptic (povidone-iodine), plus
- Antibiotic (fourth-generation fluoroquinolone)
- Careful wound construction and suture if in doubt
- Avoid hypotony and ingress of fluid
- ? Intracameral antibiotic

## Changing Perspectives: Advancing the Treatment of Age-related Macular Degeneration — Introductory Remarks



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Despite extensive research, there is no universal definition of age-related macular degeneration (AMD). Moreover, differences in definitions and methodology among studies of the condition have compounded the problem. The AMD Alliance International has produced the following definition:

- AMD is a sight-threatening retinal disease, predominantly macular, that is usually

progressive; AMD generally occurs at the age of 55 years or older and is associated with multiple environmental and genetic factors

- AMD is divided into early and late stages. Early AMD is of the dry type, characterised by relatively good visual function and the presence of drusen and/or pigment epithelial changes with a variable risk of progression to late disease
- late AMD can be either of the dry or the wet type and is usually characterised by significant loss of vision. The clinical signs are geographic atrophy, neovascularisation or pigment epithelial detachment.

Approximately 25 to 30 million people worldwide are affected by some form of

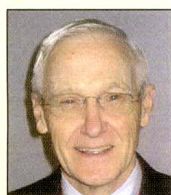
AMD, a number expected to triple in the next 25 years. AMD is the world's third leading cause of blindness after cataract and glaucoma. Data on AMD from Singapore are limited, but a community-based study found a rate of 27% among 574 people aged 60 years and older.<sup>1</sup>

Despite these alarming statistics, awareness of AMD remains low, even in western countries, where it is the leading cause of blindness.<sup>2</sup> As part of the overall health package for vision, the Scientific Advisory Panel of the AMD Alliance International recommends that people aged 55 years and older should have regular dilated fundus examinations performed by a qualified eye health professional every 2 years.

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## A New VISION for the Treatment of Age-related Macular Degeneration



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Age-related macular degeneration (AMD) is a leading cause of severe, irreversible vision loss in industrial countries. Approximately 75% to 90% of severe central vision loss is attributable to neovascular (exudative or 'wet') AMD, although patients with this condition will progress to the atrophic or 'dry' form if they live long enough. The key pathologic process in neovascular AMD involves vascular endothelial growth factor (VEGF)-mediated choroidal neovascularisation, and is associated with symptoms of oedema, exudate, and haemorrhage, and eventual scar tissue formation. Fortunately, neovascular AMD

is susceptible to recently introduced molecular therapy.

### Anti-vascular Endothelial Growth Factor Therapy

Whereas previous treatments for AMD such as laser photocoagulation and photodynamic therapy were suitable for only a minority of patients with wet AMD, a new era in treatment of the exudative form of macular degeneration has been ushered in by the availability of the targeted anti-VEGF<sub>165</sub> therapy Macugen (pegaptanib). This agent targets the specific isoform that is upregulated in the pathogenesis of AMD (VEGF<sub>165</sub>), and is suitable for use in all forms of AMD, provided the disease is identified sufficiently early in its course.

Macugen is a high-affinity oligonucleotide that selectively binds VEGF<sub>165</sub>, thus inhibiting AMD while sparing the normal vasculature.

The properties of Macugen relevant to its therapeutic activity include antiangiogenic, anti-permeability, and anti-inflammatory effects.<sup>1,2</sup> Mouse models have been used to demonstrate that normal and pathological retinal neovascularisation can be differentiated in that all isoforms of VEGF are upregulated in the normal situation, but in proliferative retinopathy only VEGF<sub>164</sub> (equivalent to human VEGF<sub>165</sub>) is upregulated.<sup>2</sup> Furthermore, blockade of VEGF<sub>164</sub> in murine models preferentially inhibits pathologic neovascularisation.<sup>2</sup>

### Pivotal Study

The landmark VEGF Inhibition Study in Ocular Neovascularization (VISION) has established Macugen as an important advance for the management of neovascular (wet) AMD.<sup>3</sup> VISION was a randomised double-blind controlled dose-ranging study involving 1190 patients from 117 centres; patients received Macugen in 1 of 3 dosage levels (0.3 mg, 1.0 mg, or 3.0 mg by intravitreal injection once every 6 weeks) or usual care with 6-weekly placebo injections. Photodynamic

therapy was used in all groups for mainly classic lesions.

Enrolment criteria were designed to include the broadest population of patients with active neovascular AMD ever studied. Patients with AMD of all lesion subtypes with baseline visual acuity (VA) of 20/40 to 20/320 in the study eye and  $\geq 20/800$  in the fellow eye were included in the study. A lesion size of  $\leq 12$  total disc areas was permitted, and  $>50\%$  of the total lesion size had to be active subfoveal choroidal neovascularisation. Fibrosis and/or atrophy of up to 3 disc areas (i.e.,  $\leq 25\%$  of lesion) and subretinal haemorrhage of  $\leq 50\%$  of the lesion size was permitted.

In the prespecified combined analysis of the 2 trials comprising the VISION study, 70% of patients treated with the Macugen 0.3 mg dose lost fewer than 15 letters of VA at 54 weeks compared with 55% of those receiving usual care, which resulted in a relative difference of 27% between the 2 groups. All Macugen doses met the primary endpoint demonstrating a statistically significant prevention of moderate vision loss ( $<15$  letter loss) compared with usual care. The benefits of the treatment were independent of lesion subtype, location, size, or baseline VA.

Patients treated with Macugen 0.3 mg over 2 years with a baseline VA  $>20/200$  were less likely to progress to a VA  $<20/200$  in the treated eye than patients receiving usual care (36% relative treatment benefit) [Figure 1]. Subgroup

### VISION Study: Safety Summary

- Macugen demonstrated a favourable safety profile over 2 years.
- Serious systemic adverse events were uncommon and were similar for the Macugen and usual care groups.
- Most ocular adverse events were attributed by the investigators to the injection procedure and did not increase in incidence over time.
- The rate of endophthalmitis was low and demonstrated to be a modifiable risk factor when an appropriate aseptic procedure is used.

analyses of the VISION data indicate that treatment of early lesions increases the chance of visual improvement.

### Postmarketing Experience

Most patients included in the VISION cohort were non-responders to other treatments and/or had large lesions, a therapeutically challenging group; early identification of AMD could lead to substantially improved efficacy of anti-VEGF treatment. Kirsch and Hairston reported a retrospective analysis of 244 patients with early exudative AMD (255 eyes) receiving 1 to 6 (mean, 2.8) Macugen injections per eye, in combination with photodynamic therapy in 92 eyes.<sup>4</sup> A response (loss of  $<3$  lines from baseline) was achieved in 97% of patients; 19% gained  $\geq 3$  lines and only 3% lost  $\geq 3$  lines. Similar results were produced with Macugen treatment in a smaller retrospective series involving 90 eyes with newly diagnosed neovascular AMD.<sup>5</sup>

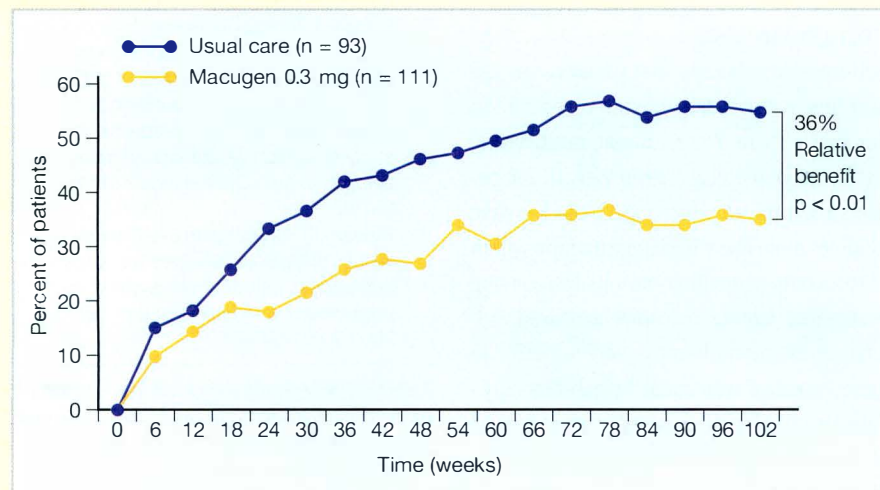
### Conclusions

Neovascular AMD is a very common cause of blindness worldwide; its prevalence is rapidly increasing as populations age. VEGF is a key driver of pathologic choroidal neovascularisation. Specific VEGF<sub>165</sub> blockade reduces pathologic VEGF effects while permitting maintenance of normal VEGF-mediated functions. A new era of medical therapy for neovascular AMD has begun.

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**Figure 1. Progression to visual acuity 20/200 in the VEGF Inhibition Study in Ocular Neovascularization (VISION): Macugen 0.3 mg versus usual care.**



*From the Pfizer Ophthalmic satellite symposium Changing Perspectives: Advancing the Treatment of Age-related Macular Degeneration held at the 21st Congress of the Asia-Pacific Academy of Ophthalmology, Singapore, 12 June 2006.*

# Redefining the Treatment Paradigm for Glaucoma



Dr John Thygesen  
Glaucoma Clinic  
Copenhagen University  
Hospital  
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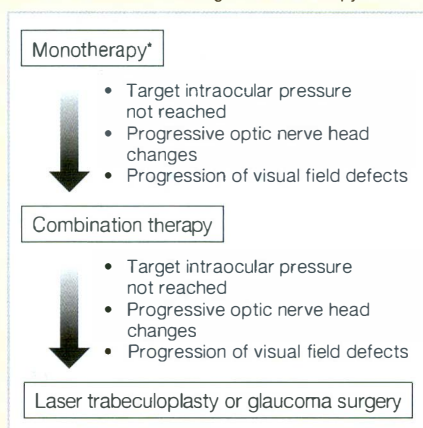
Intraocular pressure (IOP) is the main and only modifiable risk factor in glaucoma. Ideally, the management of glaucoma should aim to preserve visual function and maintain the patient's quality of life without causing untoward effects. These benefits should be maintained for the expected life of the patient and at sustainable cost. Figure 1 summarises the main steps in management.

## Medical Therapy Approach

Reduction of IOP by medical treatment remains the mainstay of glaucoma therapy. International guidelines such as the Asia Pacific Glaucoma Guidelines<sup>1</sup> and the European Glaucoma Society Guidelines<sup>2</sup> recommend monotherapy as the initial intervention for the reduction of IOP. If, IOP has already been lowered with this monotherapy and the target pressure has not been achieved, a second molecule can be added only if the first molecule was effective in

**Figure 1. Overview of glaucoma therapy.**

\* If the initial monotherapy treatment is not effective in intraocular pressure-lowering, it is recommended to replace (switch) to another monotherapy instead of adding a new molecule, which will perhaps not be more effective than a change of monotherapy.



reducing pressure. However, if during initiation of this monotherapy, treatment is not effective as regards IOP, the treatment in question should be replaced by another monotherapy instead of adding a new molecule, which will perhaps not be more effective than a change of monotherapy. When combination therapy is needed, it is logical to combine therapies with differing and complementary modes of action.

## Intraocular Pressure-lowering Efficacy

In terms of IOP-lowering efficacy (percent reduction), the prostaglandin derivatives such as latanoprost have the greatest peak effect (about 30% reduction), followed by  $\beta$ -blockers,  $\alpha_2$ -agonists and pilocarpine (25%), and topical carbonic anhydrase inhibitors and sympathomimetics (20%). The greater efficacy of latanoprost compared with timolol in lowering diurnal IOP at 3 to 6 months was demonstrated in a meta-analysis of 8 studies involving over 1200 patients with open angle glaucoma.<sup>3</sup> In addition, agents such as latanoprost are more convenient to dose. Studies from the Asia Pacific region have also reported the superiority of latanoprost over timolol in patients with chronic angle closure glaucoma.<sup>4</sup> Furthermore, the IOP-lowering effect of latanoprost was independent of the degree of angle closure.<sup>5</sup>

## Long-term Use

IOP-lowering therapy that patients can use over time is associated with improved clinical outcomes. In an observational, multicentre, retrospective medical chart review of 260 patients, those initially receiving a  $\beta$ -blocker were 3.8 times more likely to change therapy within 2 years compared with those initially receiving latanoprost.<sup>6</sup> Clinical outcomes associated with latanoprost monotherapy were superior to those associated with initial  $\beta$ -blocker therapy.<sup>7</sup> Patients initially given latanoprost remained with the therapy more than twice as long as did those initially given a  $\beta$ -blocker.

## Safety

Few studies have prospectively evaluated the long-term safety of ocular hypotensive medications. Efficacy studies often are only of short duration, and lack of evidence of an adverse event does not necessarily mean that an effect does not occur. Topical  $\beta$ -blockers are associated with an excess risk of cardiovascular and respiratory diseases in elderly patients.<sup>8</sup> However, a 5-year prospective safety study has shown that latanoprost is both safe and well tolerated for the long-term treatment of open angle glaucoma.<sup>9</sup>

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From the Pfizer Ophthalmics satellite symposium *Improving Patient Outcomes in Glaucoma: Translating Evidence into Clinical Practice*, held at the 21st Congress of the Asia-Pacific Academy of Ophthalmology, 11 June 2006.



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The rationale for the study should be summarised and pertinent background material outlined. This should not include findings or conclusions.

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This section should describe the methodology in sufficient detail to leave the reader in no doubt as to how the results are derived.

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#### *Discussion*

Data given in the Results section should not be repeated here. This section should present the implications and limitations of the study. The Discussion may also include

an evaluation of methodology and of the relationship of new information to the existing body of knowledge in the field. Conclusions should be incorporated into the final paragraph and should be consistent with — and completely supported by — data in the text.

### Acknowledgement(s)

Acknowledgements can be made to people who have offered assistance in the research or preparation of the manuscript and who do not fulfil authorship criteria. Research or project support should also be stated, as well as any conflicts of interest.

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Cheung JC, Wright MM, Murali S, Pederson JE. Intermediate-term outcome of variable dose mitomycin C filtering surgery. *Ophthalmology* 1997;104:143-149.

#### Supplement

Taylor A, Jacques PF, Epstein EM. Relations among aging, antioxidant status, and cataract. *Am J Clin Nutr* 1995;62 (6 Suppl): 1439-1447.

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Tables must be typed in Table format after the references or provided in a separate Microsoft Word file. All Tables must be cited in numerical order in the text. A brief title should be supplied for each Table and a short heading provided for each column. Explanatory matter should be placed in footnotes, not in the heading. Abbreviations should be avoided in Tables. If abbreviations are necessary, they must be explained in a footnote. Statistical measures of variation such as standard deviation, standard error of the mean, and confidence interval should be identified in the column headings.

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spelling should comply with the Concise Oxford English Dictionary

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# APAO 2006 KEYPOINT SUMMARIES



From the 21st Congress of the Asia-Pacific Academy of Ophthalmology, Singapore, 10-14 June 2006

## MICROCOAXIAL PHACOEMULSIFICATION WITH OZIL

Takayuki Akahoshi, Mitsui Memorial Hospital, Tokyo, Japan  
Abstract A203

- To assess cataract removal through a sub-2-mm incision and implantation of a 6.0-mm optic IOL through the same incision using the Nano Sleeve.
- The tip for the OZil torsional handpiece was modified and a countertraction implant technique was used to implant a 6.0-mm optic single-piece AcrySof IOL.
- More than 5000 AcrySof lenses have been implanted without complications. The final incision sizes ranged from 1.9 mm to 2.1 mm.
- Sub-2-mm coaxial phacoemulsification surgery with a 6.0-mm AcrySof lens is a new standard for cataract surgery.

## ACRYSOF RESTOR LENS IMPLANTATION AFTER EXCIMER LASER PHOTOABLATION

Samuel Masket, Advanced Vision Care, Los Angeles, USA  
Abstract F1077

- To determine visual outcomes and satisfaction of patients undergoing AcrySof ReSTOR IOL implantation for cataract after excimer laser photoablation.
- All eyes achieved uncorrected distance VA of  $\geq 20/30$  and uncorrected near VA of  $\geq J2$ . 5 of 6 eyes had VAs of 20/25 and J2. Mean optical spectacle error was -0.25 D, and all eyes demonstrated a cylinder error of  $\leq 0.5$  D.
- Excellent outcomes may be obtained for patients post-refractive surgery with appropriate application of new technology.

## ACRYSOF RESTOR INTRAOCULAR LENS FOR CATARACT

Hongsheng Bi, Jinan Shierming Eye Hospital, Jinan, China  
Abstract F1089

- To evaluate the efficacy, safety, and early visual quality of the AcrySof ReSTOR MIOL.
- AcrySof ReSTOR MIOLs were inserted into 40 eyes of 20 patients and monofocal IOLs were inserted into 36 eyes of 18 patients as a control.
- There were no significant differences between corrected near and distance visual acuity, uncorrected distance visual acuity, contrast sensitivity, glare sensitivity, visual fields, and spherical aberrations.
- Greater satisfaction was found among patients receiving the AcrySof ReSTOR MIOL ( $p < 0.05$ ).
- AcrySof ReSTOR MIOL implantation is safe and effective, providing excellent near and distance visual acuity and reducing spectacle dependence.

Results of the AcrySof ReSTOR multifocal intraocular lens compared with a monofocal intraocular lens.

Patient group	Number of patients (%)
<i>Visual acuity <math>\geq 0.5</math></i>	
AcrySof ReSTOR intraocular lens	37/40 (92.5)*
Monofocal intraocular lens	12.36 (33.3)
<i>Visual acuity <math>\geq 1.0</math></i>	
AcrySof ReSTOR intraocular lens	13/40 (32.5)*
Monofocal intraocular lens	0.36 (0.0)

\*  $p < 0.05$ .

## EXPERIENCE WITH RESTOR INTRAOCULAR LENSES

Sudipto Pakrasi, Carreen Pakrasi, Eye Microsurgery Associates, Aashlok Hospital, New Delhi, India  
Abstract F1092

- To evaluate 100 patients undergoing implantation of an apodised diffractive optic PC IOL.
- All except 2 patients were satisfied with the results for the entire range of vision without the use of glasses 4 weeks postoperatively.
- Surgical techniques using the AcrySof ReSTOR IOL can treat far- and near-sightedness. The apodised diffractive optic of the AcrySof ReSTOR IOL represents a new concept in IOL design technology providing superior visual performance and patient satisfaction.

## CONTRAST SENSITIVITY WITH ACRYSOF ASPHERIC INTRAOCULAR LENSES

Charith N Fonseka, Eye Hospital, Colombo, Sri Lanka  
Abstract F1152

- To evaluate the performance of the AcrySof Aspheric Natural IOL compared with the AcrySof Natural IOL.
- 80 eyes undergoing cataract surgery were randomly assigned to group 1, receiving the AcrySof Aspheric Natural IOL, and group 2, receiving the AcrySof Natural IOL.
- Distance visual acuities were similar between the groups at each postoperative visit. Photopic and mesopic contrast sensitivity were significantly better in patients in group 1.
- The AcrySof Aspheric Natural IOL provides better contrast sensitivity under both photopic and mesopic conditions than the AcrySof Natural IOL.

## PHACOEMULSIFICATION WITH ACRYSOF RESTOR IMPLANTATION

Yuying Shi, Beijing Tongren Hospital, Beijing, China  
Abstract P2277

- To evaluate visual outcomes after implantation of the AcrySof ReSTOR MIOL, and assess the apodised diffractive MIOL.
- Thirty one eyes of 28 patients with cataract or precataract underwent phacoemulsification and AcrySof ReSTOR IOL implantation.
- 100% of eyes obtained uncorrected distance vision of  $\geq 0.7$  and 93.5% of eyes obtained uncorrected near vision of  $\geq J3$ .
- AcrySof ReSTOR MIOL implantation is a safe and effective treatment for cataract. The AcrySof ReSTOR MIOL provides excellent outcomes for both distance and near vision and reduces dependence on spectacles for near vision.

## CLINICAL OBSERVATIONS OF BLUE LIGHT-FILTERING INTRAOCULAR LENS

Jian Ye, Department of Ophthalmology, DaPing Hospital, Chongqing, China  
Abstract P2297

- To investigate the safety and efficacy of the blue light-filtering AcrySof Natural IOL compared with the AcrySof single-piece IOL.
- 314 eyes of 242 patients were treated with phacoemulsification via a clear corneal incision and insertion of an IOL.
- There were no significant differences between the 2 groups for uncorrected

and corrected visual acuity. Patients who had the single-piece AcrySof IOL implanted found their vision overwhelmingly bright postoperatively compared with patients receiving the AcrySof Natural IOL group.

- The blue light-filtering IOL is safe and effective, and can reduce bright postoperative vision with no negative impact on quality of vision.

### SAFETY OF PROPHYLACTIC INTRACAMERAL VIGAMOX

Cesar Ramon G. Espiritu,<sup>1</sup> Victor L. Caparas,<sup>2</sup> Joanne G. Bolinao<sup>1</sup>  
<sup>1</sup>American Eye Center, Mandaluyong City, and <sup>2</sup>The Medical City, Pasig City, The Philippines

Abstract P2019

- To determine the safety of intracameral Vigamox in 50 eyes undergoing cataract surgery.
- All eyes received 0.1 mL intracameral Vigamox 0.5% ophthalmic solution containing 500 µg of moxifloxacin.
- All eyes had postoperative best-corrected visual acuity of  $\geq 20/25$ . All eyes had only trace to +1 cell and flare anterior chamber reaction 1 day after cataract surgery. Mean pre- and postoperative endothelial cell counts were 2520.71 and 2557.46, respectively. The mean pachymetry difference of 24.87 pre- and postoperatively was statistically significant ( $p = 0.0018$ ).
- Intracameral Vigamox 0.5 mg/mL appears to be safe in terms of visual rehabilitation, anterior chamber reaction, and corneal endothelial cell density.

### MULTIFACETED THERAPY FOR ALLERGIC CONJUNCTIVITIS

Peter Smith, Bond University, Queensland, Australia

Abstract F1033

- Literature review to assess the immunology and multiple points of action of olopatadine for allergic conjunctivitis.
- Mechanisms of olopatadine:
  - selective H1 receptor antagonist with rapid onset and a slow rate of dissociation from the H1 receptor
  - reduces arachidonic acid release from membrane phospholipids, inhibiting the release of leukotrienes, thromboxane, and PAF from eosinophils
  - inhibits histamine-mediated release of cytokines such as interleukin-6 (IL-6) and IL-8
  - reduces the upregulation of adhesion molecules such as ICAM-1 and E-selectin, and reduces vascular leak
  - inhibits prejunctional stimulation of peripheral sensory nerves by tachykinins.
- These multiple actions result in effective inhibition of both the allergic and late-phase responses to allergen challenge.
- Olopatadine has multiple points of impact on allergic inflammation and is the safest and most effective agent for the treatment of allergic conjunctivitis.

### OCULAR PENETRATION AND MICROBIOLOGICAL EFFICACY OF FOURTH-GENERATION FLUOROQUINOLONES

Terrence O'Brien, University of Miami, Miami, USA

Abstract S550

- A prospective randomised double-masked clinical trial to correlate the ocular penetration and microbiological activity of moxifloxacin 0.5% and gatifloxacin 0.3% following topical administration for cataract surgery.
- Disk diffusion analysis showed that the disks treated with moxifloxacin resulted in a 24-mm zone of inhibition, while gatifloxacin showed no activity against the test organism *Staphylococcus aureus*.
- Moxifloxacin provided greater penetration in the aqueous humor than gatifloxacin, resulting in a marked differentiation in observed microbiological

### Comparison of moxifloxacin and gatifloxacin following cataract surgery.

	Moxifloxacin (SD) [µg/mL]	Gatifloxacin (SD) [µg/mL]	p Value
Aqueous humor concentration	1.80 (1.21)	0.48 (0.34)	0.00003
Minimum inhibitory concentration	0.06	0.13	

activity that may have clinical significance in the prevention of *Staphylococcus* infections following cataract surgery.

### VISUAL FUNCTION AFTER ACRYSOF NATURAL LENS IMPLANTATION

Zhenping Zhang, Zhongshan Ophthalmic Center of Sun Yat-sen University, Guangzhou, China

Abstract P2299

- A prospective study of the effects of higher order aberrations (HOAs) and contrast sensitivity function (CSF) on visual function of patients undergoing AcrySof Natural IOL implantation for age-related cataract.
- Patients randomly received the AcrySof SN60AT IOL ( $n = 20$ ) and AcrySof SA60AT IOL ( $n = 25$ ).
- Compared with the SA60AT IOL, the SN60AT IOL decreased total HOA and Z3 wavefront aberrations, and increased high spatial frequency close to that of normal eyes and improved visual function.
- SN60AT IOL may cause an increase in HOA, SA, and Z4 when compared with normal eyes, Coma, Z3, and Z5 were not significantly changed. The results for SN60AT were better than those for the SA60AT IOL.

### VISUAL FUNCTION AFTER ACRYSOF NATURAL INTRAOCULAR LENS IMPLANTATION

Yun-E Zhao, Eye Hospital of Wenzhou Medical College, Wenzhou, China

Abstract P2300

- To evaluate wavefront aberrations and contrast sensitivity of the AcrySof Natural IOL, 47 patients with senile cataract were randomly assigned to receive AcrySof Natural IOLs ( $n = 23$ ) or AcrySof single-piece IOLs ( $n = 24$ ).
- The AcrySof Natural IOLs resulted in significantly higher spatial contrast sensitivity than the AcrySof single-piece IOLs in the low and middle frequencies. There was no significant difference between blue light-filtering IOLs and UV IOLs in wavefront aberrations.
- Blue light-filtering AcrySof Natural IOLs are preferable to UV IOLs for preserving spatial contrast sensitivity in the early postoperative period, but did not change wavefront aberrations.

### APPLICATION OF HIGH VACUUM AND BURST MODE TO PHACOEMULSIFICATION WITH INFINITI

Guo Haike, Hongyang Zhang, Guangdong Provincial Peoples Hospital, Guangzhou, China

Abstract F1083

- To observe the differences of energy and effects on oculus during phacoemulsification with the INFINITI Vision System when using different vacuums.
- The INFINITI phacoemulsification machine was used at a flow rate of 40 cc/minute, burst mode, and vacuum of 300 mm Hg or 600 mm Hg for lens nucleus grade III or V.
- For nucleus grade III and vacuum of 300 mm Hg or 600 mm Hg, the average power was 48%-s and 32%-s, respectively ( $p < 0.01$ ). For nucleus grade IV and vacuum of 300 mm Hg or 600 mm Hg, the average power was 201 %-s and 159%-s, respectively ( $p < 0.01$ ).
- Under high vacuum ( $>600$  mm Hg), the INFINITI vision system displays excellent anterior chamber stability. Application of high vacuum and burst mode to cataract phacoemulsification can save phacoemulsification power, shorten surgical time, and enhance the safety of the operation.

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### Free Paper Presentation

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The deadline for ON-LINE abstract submission is 30 September 2006.

For more information, please contact:

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**References:**

1. Higginbotham EJ, Feldman R, Stiles M, Dubiner H, for the Fixed Combination Investigative Group. Latanoprost and timolol combination therapy vs monotherapy: one-year randomized trial. *Arch Ophthalmol*. 2002;120:915-922. 2. Data on file. Pfizer Inc, New York, NY.

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