

Repair of Canalicular Lacerations

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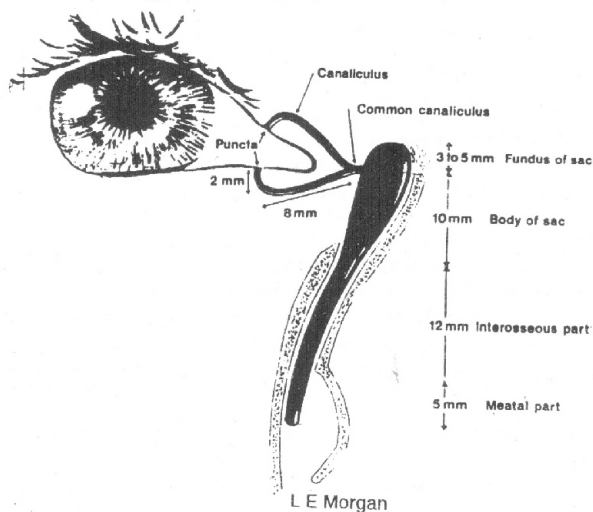
ABSTRACT

We operated on 19 patients with canalicular lacerations at Lahore General Hospital, Lahore, during Feb 1988 to Sept 1998 (11 years), 8 under general anaesthetic and 11 under local infiltration. We passed silicon tubing to keep the lumen of the canaliculus patent. The tubing was left in situ for 3 months. Average follow-up time was 6 months. 14 patients (73.7%) were happy, 3 patients (15.8%) were comfortable, while 2 (10.5%) were failures, with persistent epiphora.

INTRODUCTION

Upper and lower canalicular lacerations are associated with lid trauma when it involves the medial one-sixth or the lacrimal portion. Trauma may be iatrogenic or accidental. These lacerations are troublesome to the patient because of epiphora and to the surgeon repairing these irregular lacerations. Trauma along the inner one-third of the upper lid may damage the trochlea, followed by superior oblique muscle paresis¹.

Lacrimal drainage system anatomically consists of puncta, canaliculi, lacrimal sac and nasolacrimal duct opening into the inferior meatus of the nose (Fig). Puncta open into the canaliculi which traverse a 2mm vertical and 8mm horizontal course before opening into the lacrimal sac as a common canaliculus in 90% and separately in 10% of cases. Lacrimal sac and nasolacrimal duct are about 30mm long and open in the back of the nose².



Fig

The lower canaliculi suffer injury more commonly than the upper ones and occlusion or trauma of the upper canaliculus has less significance, because three-fourths of the lacrimal secretions are drained by the lower canaliculus. Thus such injury does not cause epiphora³.

Whenever there is injury to the lid, particularly to the medial one-third, one should always look for the puncta and the canaliculi for their integrity and patency. Canalicular surgery should not be postponed for more than 24-48 hours⁴. During the interim period antibiotics should be given systemically and locally, till the circumstances are favourable and the operation theatre with microscopic facilities is available and till the nonocular injuries are repaired.

MATERIALS AND METHODS

Patients were selected from the Eye Outpatient and the Casualty Departments of Lahore General Hospital, Lahore, during the period from Feb 1988 to Sept 1998. We examined them thoroughly as regards the vision, lids, conjunctiva, cornea, anterior chamber, pupil and fundus. During the 11 years we repaired 19 canalicular lacerations. The ages ranged from 1 year to 60 years. 10 patients (52.6%) were below the age of 10 years (Table-1).

Table 1: Age distribution.

Age Group(years)	No. of patients
0-10	10
11-20	2
21-30	2
31-40	1
41-50	2
51-60	2

11 patients (57.9%) had trauma to the right eye and 8(42.1%) had left eye involvement. Lower lid trauma was commoner than the upper lid trauma, i.e. 13 out of 19(68.4%) involved the lower lid (Table-2).

Table 2: Distribution of injuries to the upper and lower lids.

Total No.	Right Eye		Left Eye	
	Upper lid	Lower lid	Upper lid	Lower lid
19	3(15.8%)	8(42%)	3(15.8%)	5(26.3)

12 out of 19 patients were male and 7 female (Table-3). Nature of trauma was enquired about and majority (7) had roadside accidents, 4 each were hurt during fights and play. One patient was pecked by chicken, 2 patients had rodent ulcers along the medial canthi involving the lower canaliculi, which were excised or damaged during the excision of the primary growth (Table-4).

Table 3: Sex distribution.

Male	12
Female	7
Total	19

Table 4: Nature of trauma.

Roadside accident	7
Fight	4
Fall from roof	1
Chicken peck	1
Growth excision	2
Trauma while playing	4
Total	19

Two patients had lid lacerations, in addition to the lacrimal portion. They were repaired. We operated on 8 patients under general anaesthesia, while 11 were done under local infiltration. General anaesthesia was used for children and noncooperative patients.

PROCEDURE

We tried to find the proximal severed end of the canaliculus in injured tissues, after cleaning the wound under the microscope. We did not try the air bubble method⁵. In one case Ringer's solution mixed with fluorescein 2% dye was injected through the intact canaliculus. The leakage of fluid in the surgical field does not provide any clear clue about the severed end of the canaliculus. This might be due to retraction of the proximal end within the surrounding tissues.

We had to resort to the retrograde passage of black 4/0 silk passed through the sound punctum and canaliculus and coming out of the severed end of the other. This procedure is just like the passage of a pigtail probe. Pigtail probe was not used in our study. Instead we used a small 18mm round-bodied, non-eyed needle with 4/0 black silk. The sharp end was caught in an artery forceps at 90 degrees and the needle was passed through the dilated punctum and canaliculus. This was passed very gently without any pressure along the canalicular passages, till the black threaded end appeared into the tissues through the severed end of the canaliculus. Keeping the needle in place, the thread was pulled and the silicon tube was tied with the thread. Then the needle and the thread both were pulled back. The silicon tube occupied the severed canaliculus, the normal canaliculus and the punctum. The same procedure was repeated in the distal portion of the canaliculus. The tube was tied with thread, pulled through the distal end of the canaliculus and the punctum.

This procedure brought both ends of the canaliculus in line with each other. The tube was caught near both puncta, and was tied together 2mm away from the puncta. Excess of the tube and sutures were cut. Many workers pull the knotted end into the canaliculus², but we did not. We rather left it in the conjunctival sac along the caruncle in the medial canthus.

The orbicularis muscle was stitched separately with 6/0 catgut and the conjunctiva with 8/0 virgin silk suture. Skin over the laceration was sutured with 4/0 black braided silk. Gray line and the anterior and posterior lid margins were stitched first and then the rest of the skin. This avoided the notching of the lower lid at the site of trauma. We dressed the wound with antibiotic ointment and padded it. Various other methods of stitching the lid margins are described in the literature⁴.

The tube was allowed to remain in situ for three months. Skin sutures were removed after one week. We advised our patients to revisit the hospital fortnightly.

RESULTS

We repaired 19 canaliculi (13 lower and 6 upper) with silicone intubation. Immediately postoperatively, epiphora persisted in all the patients for two to three weeks. This kept on diminishing gradually, but was not cleared until the tube was removed after three months. This was mostly due to irritation of the conjunctiva by the tube and the thread. Reassurance to the patients for better results helped in maintaining the tube in situ till the healing was complete.

14(73.7%) patients were happy even after six years of surgery. They did not develop notching of the lid margin and there was no epiphora. Among them 9 had lower lids repaired and 5 had upper canalicular repairs.

Three patients were comfortable as epiphora did not persist frankly. There was larger sized lacrimal lake, which was more than 1mm. They complained of spilling over of lacrimal secretions while laughing or sneezing. Fluorescein dye clearance was delayed upto 10-15 minutes. Puncta were well in apposition with the caruncle into the lake.

Two patients did not feel any relief at all. These were the ones in whom growths at the medial canthal areas were removed and free full-thickness skin grafts were applied. Intubation was attempted for drainage of lacrimal secretion, which was not successful. This was considered total failure as the fluorescein dye did not clear from the conjunctival sac even after 30 minutes.

DISCUSSION

Although canalicular injuries are common, controversy persists regarding indications for repair and surgical methods that should be employed⁶. Many authors recommend not to repair the single canaliculus, iatrogenic damage to the normal canaliculus causes epiphora. Various methods for repair have been described^{2,3}. We think it is better to attempt the repair gently, carefully and meticulously without pressure and mishandling of the tissues. This is a procedure that warrants patience and gentle care.

In our series the commonest cause was trauma

from roadside accidents and fighting, which is a much different type of trauma than in the Western society, where dog-bite⁷ is considered more common. Physical trauma from fist injuries was more common in our series.

Trauma can be direct or indirect. Wulc and Arterberry⁸ have shown experimentally in a series of 25 cases that direct trauma causes less canalicular damage than damage to the rest of the eyelid. They postulated that in many of their cases canalicular lacerations resulted from direct trauma to the eyelid which ruptured when it was stretched acutely to the point of avulsion. They suggest that canalicular portion is more vulnerable to injury by avulsion. This suggestion applies favourably to our cases, because the roadside accidents, falls from roofs or trauma by fists cause lacerations of the canaliculi indirectly, rather than directly, as in chicken peck or by other sharp-edged instruments used.

In our series we had not used pigtail probe which is not essential for the repair. This can be done by a simple small 18mm round-body eyeless needle with a thread. This has small diameter of the stem, even less than 1mm, as against the larger diameter of a pigtail probe, though McLeish et al⁹ used it successfully in 7 cases, with high success rate.

Kennedy et al¹⁰ in a 10-year study of 222 cases have reported the common causes of canalicular laceration to be the fist (23.4%) and the dog-bite. 66% had lacerations of the lower lid, and 27.5% to the upper lid, while 6.3% had involvement of both lids. This distribution is significantly similar to our study. In our series of 19 patients lower lid trauma occurred in 13 (68.4%). They did not use any silicon tubes as stents. Postoperatively epiphora was more in adults than in children.

Jordan et al¹¹ suggest certain principles for reconstruction of the canaliculi such as the direct anastomosis, endocanicular support and avoiding trauma to uninvolved canaliculus.

Simple reapproximation of the lacerated overlying soft tissue combined with bicanalicular silicon intubation proved highly successful in managing canalicular lacerations. Probing through the lacerated canaliculi demonstrated patency in 100% of the 59 patients followed-up after stent removal¹².

Sometimes facio-maxillary trauma is extensive enough to involve the lid and the canaliculi (lacrimal

drainage system). They should be assessed properly with care and the damage detected and repaired¹³.

CONCLUSION

The canalicular lacerations should be repaired while passing the silicon tube to keep the lacrimal passages patent. We recommend this highly successful procedure even for single canalicular repair.

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Ophthalmic "Pastpourri"

Priority Claim of Construction Controversy *The Story of Bifocals*

When did Franklin first use his bifocals? He did not seem to have been wearing a pair on the evening in 1759 when he sought his woman friend. Nowhere in the Whately-Franklin correspondence is there a hint as to the exact date or who might have constructed them. One writer states that, while Franklin was in Paris, his spectacles were made for him by Secretan and then gives this optician credit for constructing Ben's first pair of bifocals in 1777. An earlier date is suggested by von Rohr. This historian is of the opinion that the first pair was made for Franklin while he was in London, prior to 1775, and that the optician was Samuel Pierce.

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Synder C. Our Ophthalmic Heritage. Little, Brown and Company. Boston, 1967; p91.

Technique

Phakonit -- A New Technique Removing Cataracts Through A 0.9 mm Incision

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INTRODUCTION

Since Charles Kelman started phacoemulsification, various new modalities have developed which have made this technique more refined. One problem still persists which is the size of the incision. The normal size of the incision had long been 3.2 mm. With time and more advances in phaco machines and phaco tips, this was reduced to 2.8 mm and then to 2.6mm. Today certain phaco machines, like the Alcon's Legacy and the Staar phaco machine, have 1.9mm phaco probes. In other words cataract surgery has become a sub-2mm incision surgery. One of the authors (Sunita Agarwal) has worked on laser cataract surgery and has achieved cataract removal through an incision below 2mm (1.8mm) in size using laser phaco energy coupled with high aspiration. But the problem of the incision size had still persisted and the 1mm barrier could not be broken. Today, the authors have developed a new technique called PHAKONIT in which the size of the incision is below 1mm. In fact the size of the incision through which the cataract is removed is 0.9mm. One of the authors (Amar Agarwal) performed this technique for the first time in the world on August 15th 1998. It was performed **without any anaesthesia**. No anesthetic drops were instilled in the eye nor was any anesthetic given intracamerally. The first live Phakonit surgery in the world was performed on August 22nd 1988 at Pune, India, by the authors (Amar Agarwal) at the Phaco & Refractive Surgery Conference. This was done in front of 350 ophthalmologists. This technique will revolutionize cataract surgery because now the foldable Intraocular lenses which pass into the eye through an incision of under 2mm (1.9mm) will have to pass through a less than 1mm incision. They will have to pass through a 0.9mm incision.

PRINCIPLE

The problem in phacoemulsification is that we have not been able to go below an incision size of 1.9mm, the reason being the infusion sleeve. The infusion sleeve takes up a lot of space. The titanium tip of the phaco hand piece has a diameter of 0.9mm. This is surrounded by the infusion sleeve which allows fluid to pass into the eye. It also cools the hand piece tip so that a corneal burn does not occur.

The authors separated the phaco tip from the infusion sleeve. In other words, the infusion sleeve was taken out. The tip was passed inside the eye and as there was no infusion sleeve present, the size of the incision was 0.9mm. In the left hand a needle (at present 18 gauge) was held which had fluid passing inside the eye. The left hand was in the same position where the chopper is normally held, i.e., the side-port incision. This acts like an irrigating chopper. The needle was bent at the tip to make it like a chopper. The assistant injects fluid (BSS) continuously at the site of the incision to cool the phaco tip. Thus the cataract is removed through a 0.9mm opening.

Terminology

The name PHAKONIT has been given because it shows phaco (PHAKO) being done with a needle (N) opening via an incision (I) and with the phaco tip (T).

TECHNIQUE

Anesthesia

All the cases done by the authors have been done **Without Any Anesthesia**. In these cases no anesthetic drops were instilled in the eye nor was any intracameral anesthetic injected inside the eye. The

authors have analyzed their cases and have found that there is no difference between topical anesthesia cataract surgery and No anesthesia cataract surgery. They have, thus, stopped using anesthetic drops totally in both their hospitals in India (Bangalore and Chennai).

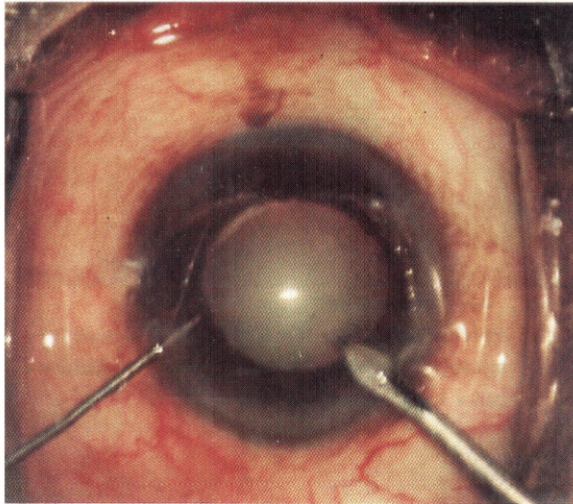


Fig-1: Clear corneal incision made with the microvitrectomy blade (0.9 mm). Note the left hand has a straight rod to stabilize the eye as the case is done without any anesthesia

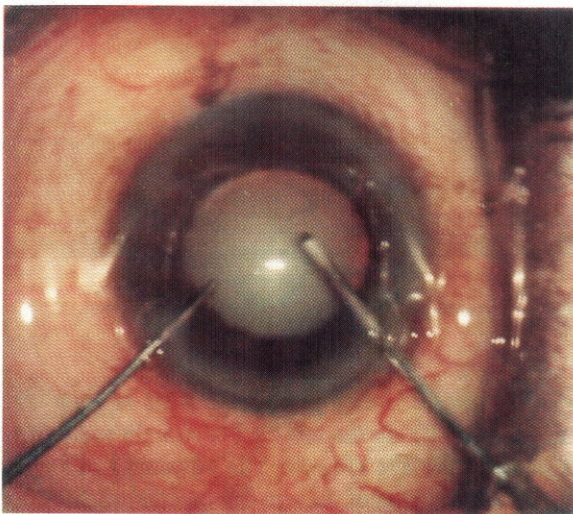


Fig-2: Rhexis started with a needle

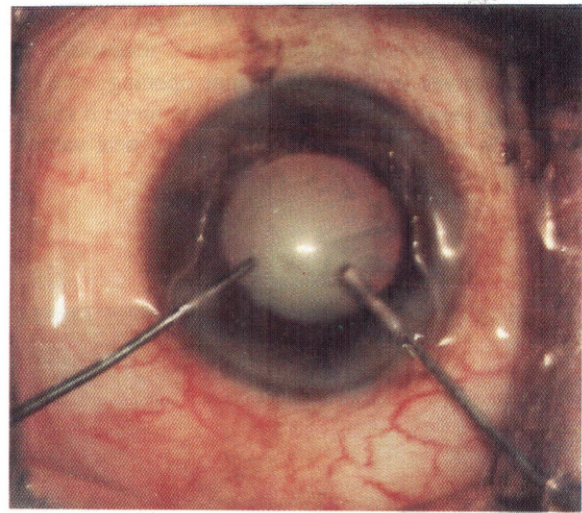


Fig-3: Rhexis nearing completion

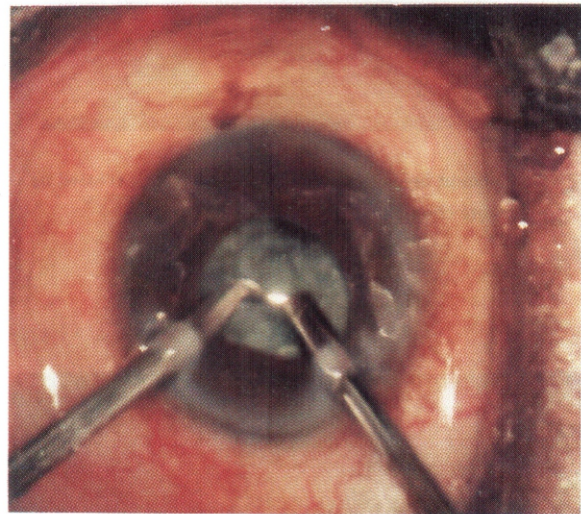


Fig-4: Phakonit started. Note the phako needle in the right hand and a needle bent like a chopper in the left hand. With improvement in instrumentation the left hand will hold an irrigating chopper.

Incision

In the first step a needle with viscoelastic is taken and pierced into the eye in the area where the side-port has to be made. The viscoelastic is then injected inside the eye. This will distend the eye so that the clear corneal incision can be made. Now a temporal clear corneal incision is made. The problem here is that the available diamond knives are all 2.6mm or larger. Since our aim is to make only a 0.9mm opening, these diamond knives are not

suitable. So a Microvitrectoretinal (MVR) blade is used (Fig-1). This creates an opening of 0.9mm. With time when the instrument companies start manufacturing diamond knives to create a 0.9mm opening, one can start using them. When this incision is made it should be done in such a fashion that a clear corneal valve is created.

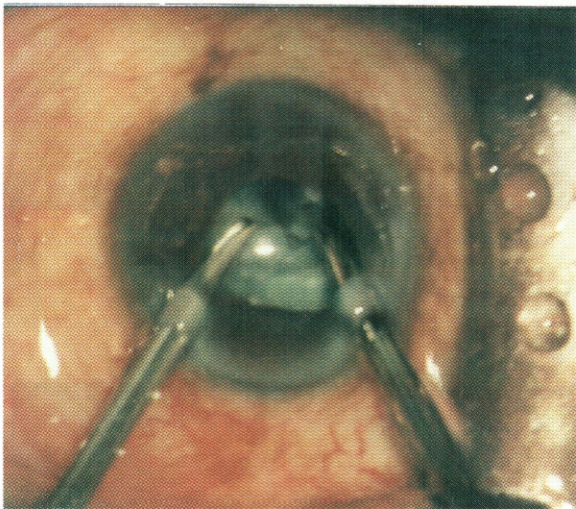


Fig-5: Phakonit being performed. Note the crack created by karate chopping.

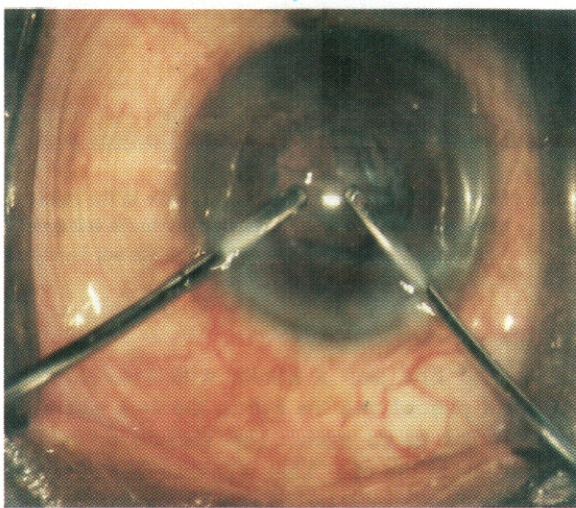


Fig-6: Bimanual irrigation/aspiration. Note the clear corneal wound does not have any corneal burns.

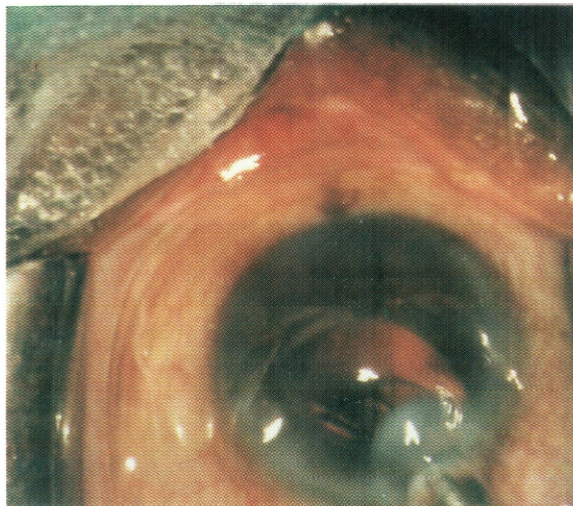


Fig-7: Plate-haptic foldable IOL implanted. With time the foldable IOLs will come to pass through an incision of below 1 mm.

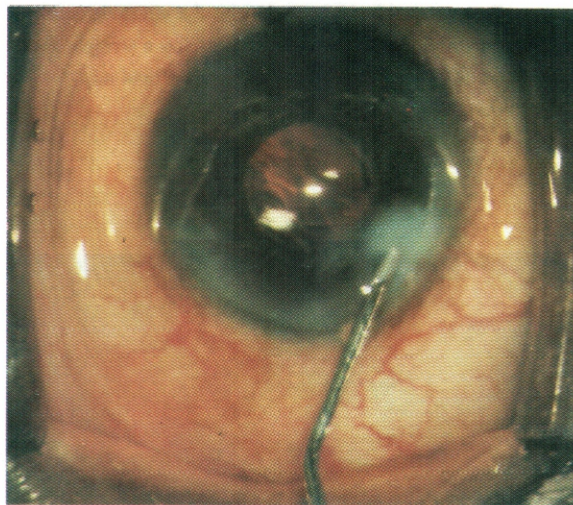


Fig-8: Stromal hydration of the clear corneal incision.

Rhexis

The rhexis is then performed. This is done with a needle (Fig-2). In the left hand a straight rod is held to stabilize the eye (Fig-3). The advantage of this is that the movements of the eye can be controlled as one is working without any anesthesia.

Hydrodissection

Hydrodissection is performed and the fluid wave passing under the nucleus checked. No hydrodelamination or rotation of the nucleus is done.

Phakonit

The phaco tip without the infusion sleeve is kept in the right hand. In the left hand a needle of 18 gauge is taken. This is bent at the tip to make it like a chopper. The side-port is enlarged to the size of the needle. The needle is then passed through the side-port into the eye. This needle is connected to the phaco machine. When the foot switch is in position 1, the fluid passes into the eye and the eye gets distended. Now the phaco tip is passed into the eye. This is passed through the 0.9mm incision. **Remember the Phaco Needle Has No Infusion Sleeve (Fig-4).**

The foot switch is pressed for phacoemulsification. Karate chopping is done with the left hand (Fig-5) and the nucleus removed. The assistant injects fluid over the phaco tip at the area of the clear corneal incision to prevent thermal burns of the eye.

Cortical Washing, Foldable IOL Implantation And Stromal Hydration

Cortical washing is done with bimanual irrigation/aspiration technique (Fig-6). Note in Fig-6 the nucleus has been removed but there are no corneal burns. Then the foldable IOL is implanted (Fig-7). At present, the smallest available is the Staar sub-2 mm foldable IOL. So, one has to increase the size of the incision from 0.9mm to 2mm. With time size of the foldable IOLs will come down to less than 1mm and the size of the incision will not have to be enlarged. The authors prefer the Staar plate-haptic foldable IOLs with large fenestrations. Finally the viscoelastic is removed with the bimanual irrigation/aspiration technique and stromal hydration is done. Injecting fluid into the sides of the clear corneal incisions (Fig-8) produces stromal hydration. No subconjunctival injection is given or padding applied on the eye. The patient walks out of the operation theatre and is seen the next day. The next follow-up is after a month and suitable glasses are prescribed if necessary.

DISCUSSION

This technique of Phakonit can change various concepts of cataract surgery. One of the main bugbears of cataract surgery was the 1-mm barrier. With Phakonit this barrier is broken. There are various questions which come to one's mind regarding

this technique and these will have to be answered with time as this procedure is so nascent.

The first is of the left hand. The amount of fluid following into the eye normally in phaco is about 40ml/minute. If we have a 20 gauge cannula in our left hand, enough fluid does not flow inside the eye. So one has to use an 18 gauge needle, otherwise when doing phacoemulsification the anterior chamber will collapse as the amount of fluid passing into the eye is very little compared to the suction.

The second problem is that the left hand cannot perform adequate chopping as it holds the needle bent like a chopper with fluid passing into the eye. Both these problems (the first and the second) can be solved with the use of an anterior chamber maintainer.

The third problem is that of the foldable IOL. At present the smallest one can get is of 1.9mm size. Remember phaco came before the foldable IOLs. So obviously once Phakonit will catch on, the companies will have to manufacture foldable IOLs which pass through incisions less than 1 mm in size.

Another solution for the thermal burn problem could be to paint the tip of the phaco needle (suggested by Dr. P.N. Nagpal) to insulate it from heating any structures.

The solution to the problems of Phakonit could also be the surgery dubbed a **Three-Port Phakectomy** in which an anterior chamber maintainer could be like the infusion cannula, an irrigating chopper could be the second port and the phaco needle the third port, akin to a three-port vitrectomy.

SUMMARY

There are various problems which are encountered in any new technique and so also there are with Phakonit. With time these will have to be resolved. The important point is that today we have broken the 1mm barrier for cataract removal. This can be done easily by separating the phaco needle from the infusion sleeve. As the saying goes: We have miles to go before we can sleep.

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Ophthalmic "Pastpourri"

Samuel Pierce and the Two Bens

The Story of Bifocals

The name of Samuel Pierce crops up again in the story of bifocals. In the 1901 edition of his *Histoire des lunettes*, Pansier casts doubt on Franklin's priority to the invention. Accepting, with little question, a brief note taken from Kitchiner's *Economy of the Eyes*, Pansier more than suggests that the inventor of bifocals was Samuel Pierce and that the first man to wear them was Benjamin West, American artist living in England. The Kitchiner note reads as follows:

"The late President of the Royal Academy--Benjamin West, Esq. was in the habit of using Divided Glasses for many years; the upper half was 30 inches focus, and the lower of 12. But for some time before his death, which happened when he was about 90 years of age, he had the upper half of 30 inches, the under half of only 8 inches focus." The glasses were round and an inch and a half in diameter.

The above account of Mr. West's spectacles is another of the contributions of Mr. S. Pierce who made the spectacles.

One fact in the above is not correct. Benjamin West was born in 1738, he died in 1820. His age at death was 82, not nearly 90.

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Snyder C. Our Ophthalmic Heritage. Little, Brown and Company. Boston. 1967; pp91-92.

Ophthalmic "Pastpourri"

Claim of Priority Controversy-Continued

The Story of Bifocals

The West-Pierce claim of priority, weak at best, is further weakened when the ages of the two Benjamins are compared. Franklin was born in 1706, 32 years before his friend West. In 1775, the earliest date suggested for Franklin to have used his bifocals, West was 37 and Franklin 69. In 1777, the second suggested date, Franklin was 71 and West was 39. In 1784, the year of the first Whately-Franklin letter, Franklin was 78 and West was 46. Today, in Boston, Franklin's birthplace, it is the consensus that the "average man" does not feel the need of bifocals before 45. Accepting this as fact, and accepting as fact that Benjamin West was an "average man," then he would not have needed bifocals prior to 1784, the year that Franklin wrote of them. Not needing them, he would not have gone to Samuel Pierce to have a pair constructed.

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Snyder C. Our Ophthalmic Heritage. Little, Brown and Company. Boston. 1967; p92.

Abstracts

Edited by Tahir Mahmood

Is the single use of intraoperative 5-fluorouracil in filtering surgery for high-risk cases enough?

Watts P, Karia N, McAllister J

Eye 1998; 12: 374-8

A major cause of failure of filtering surgery is the proliferation of fibroblasts postoperatively. The administration of 5-fluorouracil (5FU), an antimetabolite that inhibits fibroblast proliferation by both its inhibition of thymidilate synthetase and its incorporation into the RNA molecule, has improved the success rate of filtering surgery.

Initially the route of administration was by twice-daily injections during the first week after filtering surgery and once-daily injections during the second week; the frequency of administration was subsequently reduced with no apparent reduction in the success rate. This method of administration is painful, involves a number of postoperative visits, is associated with significant corneal epithelial toxicity and has an increased incidence of postoperative wound leak. A single intraoperative application of 5FU at the site of filtering surgery largely avoids the above problems associated with postoperative injections and is presently the current practice. The initial results reported are encouraging.

The purpose of this study was to evaluate the efficiency of the adjunctive use of a single intraoperative application of 5-fluorouracil (5FU) in eyes with poor prognoses for a successful outcome with a trabeculectomy.

Twenty-four patients (25 eyes) with a mean age of 63.7 ± 14.7 years (range 27-86 years) and a history of one or more risk factors (age < 50 years, more than 3 years on topical medication, a previous failed filter, previous cataract surgery, uveitis, neovascular glaucoma) underwent trabeculectomy with the intraoperative application of 5FU on a sponge (25mg/ml) for 5 min. The average follow-up was 10.1 ± 5.5 months.

The mean preoperative intraocular pressure (IOP) was 24.7 ± 6.2 mmHg and the mean postoperative IOP was 13.9 ± 3.5 mmHg. Success, defined as an IOP within desired target levels for a

particular eye, in the presence of a functioning filter, without supplementary medical therapy, was achieved in 56.5% of cases.

It was concluded that the results of successful filters in this group of patients with moderate-to-high-risk characteristics approached similar figures quoted for trabeculectomies without the adjunctive use of intraoperative 5FU in eyes with poor prognoses with similar length of follow-up. Though the numbers were small there was a trend that indicated that the intraoperative application of a single dose of 5FU alone might not be sufficient in eyes with moderate-to-high-risk characteristics of failure of a trabeculectomy.

The effect of timolol drops on respiratory function

Sadiq SA, Fielding K, Vernon SA

Eye 1998; 12: 386-9

Since the introduction of the first topical beta-blocker (timolol) for use in glaucoma in 1978, this form of therapy has become the commonest medical treatment for the condition. More recently, attention has been focused on the adverse drug reactions of topical timolol, especially with regard to respiratory function in the elderly.

This study was designed to assess whether timolol causes an alteration in lung function in patients without pre-existing respiratory disease and who have not suffered the impact of long-term β_2 blockade.

A placebo-controlled randomized, double-masked, cross-over study was carried out on 20 ocular hypertensive patients with intraocular pressures over 21 mmHg, normal optic discs and full visual fields by Humphrey perimetry. Subjects received single-dose units of timolol maleate 0.5% drops or normal saline drops. Both were instilled in one eye or systemically (sublingually). The peak expiratory flow rate (PFR), forced expiratory volume (FEV), vital capacity (VC) and FEV/VC(%) ratio were all measured both before and after each type of drop and route of administration.

Two hours after instillation of timolol there was no change in PFR ($p=0.67$) or VC ($p=0.40$), but there was a fall in FEV ($p=0.038$) and the FEV/VC (%) ratio ($p=0.041$). The fall was greatest after topical administration.

The results of the study showed that in their group of patients there was a tendency towards mild bronchial obstruction after topical timolol, although this was not clinically significant.

Vitreolensectomy in Marfan's syndrome
Hubbard AD, Charteris DG, Cooling RJ
Eye 1998; 12: 412-6

Marfan's syndrome is the most frequent cause of heritable lens subluxation. Between 50% and 80% of Marfan's syndrome patients have some degree of lens subluxation, which is usually bilateral and symmetrical. Although it characteristically occurs in a superotemporal direction the subluxation may occur in any meridian, or the lens may dislocate into the vitreous cavity or the anterior chamber. In the majority of cases lens subluxation results in optical defocus and distortion with reduction in visual acuity. If the ametropia cannot be corrected satisfactorily with spectacles or contact lenses then lens removal may be indicated. Other ocular features of Marfan's syndrome include high axial myopia, poor pupillary dilation, peripheral iris transillumination and glaucoma. Retinal detachment is a common complication of Marfan's syndrome and is related to a combination of high axial myopia, lens subluxation and aphakia. Phakic eyes of normal axial length with non-subluxed lenses are not associated with a significantly increased risk of retinal detachment.

The surgical management of subluxed lenses in patients with Marfan's syndrome by intracapsular or extracapsular lens extraction techniques has previously been associated with a high incidence of intraoperative and postoperative complications, especially vitreous loss and retinal detachment. The previously reported high incidence of postoperative retinal detachment is believed to be related to the predisposition of these eyes to retinal detachment combined with surgical techniques that result in vitreous incarceration and traction. More recent studies have claimed reduced complication rates when subluxated lenses are removed via closed intraocular microsurgical techniques, but the number of patients with Marfan's syndrome in these studies has been small and their outcome has not been studied independently from that of patients with subluxed lenses from other causes.

The outcome of pars plana vitreolensectomy in Marfan's syndrome deserves individual attention due to the perceived increased risk of lens removal, by any technique, and the propensity to retinal detachment in Marfan's patients.

The purpose of this study was to evaluate the effectiveness of pars plana vitreolensectomy in the management of subluxed lenses associated with Marfan's syndrome and to assess the need for intraoperative retinal photocoagulation to prevent postoperative retinal detachment. A retrospective review was carried out of 40 eyes of patients with Marfan's syndrome that underwent pars plana vitreolensectomy for subluxed lenses.

All patients demonstrated stable or improved visual acuity following surgery with a low incidence of complications.

The authors concluded that the pars plana vitreolensectomy was a safe and effective treatment for subluxed lenses in patients with Marfan's syndrome. It appeared that intraoperative prophylactic laser treatment need only be applied to areas of lattice degeneration to limit the incidence of postoperative retinal detachment.

Ophthalmic abnormalities in homocystinuria: the value of screening
Taylor RH, Burke J, O'Keefe M, Beighi B, Naughton E
Eye 1998; 12:427-30

Homocystinuria due to cystathionine β -synthase (CBS) deficiency is the commonest disorder of amino acid metabolism. CBS deficiency is an autosomal recessive disorder. The protein is coded on chromosome 21 (21q22.3). Considerable genetic heterogeneity exists, and at least 13 different mutations of the CBS protein have been identified. Some work has been published on phenotypic correlation with specific DNA/protein mutations. Phenotypic variability between siblings with the same genotype has also been described.

In Ireland the prevalence of homocystinuria is 1 in 52,544 births, in the United Kingdom (Manchester) 1 in 96,000; and in the United States it is 1 in 406,000. The prevalence of homocystinuria in the USA has been linked to patients with Celtic ancestry.

CBS deficiency affects the excretion of sulphur, with accumulation of homocyst(e)ine and methionine

and depletion of cysteine. Homocyst(e)ine is the sum of homocysteine, homocystine and homocysteine-cysteine disulphide in free and protein-bound forms. These metabolic abnormalities cause a wide range of ocular, cerebral, skeletal and clotting pathologies. Ocular sequelae characteristically involve visual loss associated with subluxation of the crystalline lens and myopia, although glaucoma, optic atrophy, retinal degeneration, retinal detachment, cataracts, corneal abnormalities, and atrophy of non-pigmented ciliary epithelium also occur.

The biochemical abnormality can be corrected in some patients by oral pyridoxine--so-called pyridoxine-responsive disease. Pyridoxine stimulates any residual activity of CBS. If this is unsuccessful dietary restriction of methionine and supplementation of cysteine may be required (pyridoxine non-responsive). Oral betaine may be administered as a methyl donor to facilitate the conversion of homocysteine back to methionine. With dietary compliance, the biochemical irregularities are corrected.

Since this condition exists in a presymptomatic form, widespread screening for homocystinuria, especially in high-risk areas, would be advantageous to patients if early treatment can be shown to be beneficial. To evaluate the results of screening newborns, the authors compared ophthalmic outcomes of those who were diagnosed late.

To evaluate the results of screening newborns for homocystinuria, the authors compared ophthalmic outcomes for two groups of homocystinuria patients who had been diagnosed either at birth or later than 6 weeks.

Nineteen patients had been screened and diagnosed shortly after birth, with treatment instigated before 6 weeks of age (mean follow-up and age 10.8 years; median 11 years). Eight of 17 were myopic; 13 of 15 had good vision in both eyes; one had lens subluxation. The second group of 17 patients was diagnosed later than 6 weeks, often (12 patients) because of ocular problems (mean follow-up 8.3 years; mean age 19.4 years; median age 16 years). Visual function varied from 6/6 (4 patients) to less than 6/36 (4 patients); 3 eyes had no perception of light. Thirteen patients had lens subluxation or dislocation.

It was concluded that early diagnosis and treatment of homocystinuria is advantageous.

Measurement of electrostatic charge on intraocular lenses

*Davies NP, Rassam SR, Shah SM
Eye 1998; 12: 449-52*

The study was initiated after a conversation in the operating theater on whether washing of an intraocular lens (IOL) prior to implantation in the eye was necessary or not. The materials used in lens manufacture are non-conducting and have dielectric properties. This would allow them to accumulate an electrostatic charge during handling. Any charged object exposed to the atmosphere will attract particulate matter due to the induction or presence of an opposite charge in the particle. The air in an operating theater contains dust, desquamated skin scales and airborne bacteria. Introduction of these into the eye could contribute to postoperative uveitis or at worst cause bacterial endophthalmitis.

This study was designed to determine whether manipulation of an IOL in the operating theater prior to implantation resulted in a measurable electrostatic charge on the surface of the lens.

The rationale behind washing the IOL before implantation is that the surface charge consists of excess surface electrons or holes (a 'hole' being the absence of an electron). If these are placed in contact with a conducting electrolytic solution then they can be bound with free ions in the solution and thus removed from the lens surface, resulting in a reduction of the total surface charge.

The purpose of this study was to measure the electrostatic charge on an IOL. The authors designed and built an electronic meter to measure the electrostatic charge to test the hypothesis that an intraocular lens (IOL) attains a charge during handling in the operating theater and that washing the IOL with balanced salt solution (BSS) would result in a reduction in the surface charge. Once exposed to the air a charged IOL may attract particulate matter to its surface before implantation into the eye.

This experiment was performed in the operating theater under sterile conditions mimicking cataract surgery. The lens box was opened onto a trolley and the lens container opened by a scrubbed assistant. The operator (also scrubbed) removed the lens with MacPherson's forceps. The charge on the lens was then measured without delay, and after the lens had been washed with 1-2 ml of BSS.

The mean charge on unwashed lenses was $1.43 \times 10^{-10}C$ ($n=12$) and on washed lenses was $0.59 \times 10^{-10}C$ ($n=10$). The difference in the charges was significant ($p=0.03$, unpaired t -test).

The authors concluded that washing of an IOL prior to implantation will reduce the surface charge and was, therefore, also likely to reduce the chance of contamination.

Immunopathogenesis of conjunctival scarring in trachoma

Abu El-Asrar AM, Geboes K, Tabbara KF, Al-Kharashi SA, Missotten L, Desmet V
Eye 1998; 12: 453-60

Trachoma, the world's leading infectious cause of blindness, is estimated to affect 500 million people, 7 million of whom are blind. It is caused by serovars A,B,Ba and C of *Chlamydia trachomatis*. In its early (active) stage, which is seen principally among children in endemic areas, it is characterized by a chronic follicular conjunctivitis, which affects principally the upper tarsal conjunctiva. Among older individuals in endemic areas, conjunctival scarring replaces the follicles and may lead to entropion, trichiasis and corneal blindness.

The pathological mechanisms by which trachoma causes conjunctival scarring are unclear. Although the growth of *C trachomatis* is restricted to the epithelium, the consequences of infection, namely conjunctival and subconjunctival scarring, can lead to dry eye syndrome, entropion and trichiasis. In previous immunohistochemical studies it has been demonstrated that the conjunctival biopsies from children with active trachoma showed an intense epithelial inflammatory infiltrate consisting of macrophages, T lymphocytes and dendritic cells. The stromal inflammatory infiltrate was organized as B lymphoid follicles, and there was also a diffuse infiltrate consisting of B lymphocytes, T lymphocytes, macrophages, dendritic cells and plasma cells in which IgA⁺ cell were most prevalent. In addition it has been shown that the superficial epithelial cells infected with *C trachomatis* expressed major histocompatibility complex (MHC) class II antigens, which may render these cells capable of acting as antigen presenting cells, thereby enhancing the immune response.

Prevention of trachoma-induced damage to the ocular surface requires an understanding of the factors

that promote conjunctival tissue destruction and fibrosis in trachoma. Therefore, using immunohistochemical methods we examined the in situ expression of the fibrogenic cytokines interleukin-1 α (IL-1 α), interleukin-1 β (IL-1 β), tumor necrosis factor- α (TNF- α) and platelet-derived growth factor (PDGF) in conjunctival biopsy specimens from patients with active trachoma and related the observations to the inflammatory infiltrate. These cytokines were selected on the basis of a large body of data demonstrating their importance for the induction of fibrosis.

The blinding complications of trachoma are associated with progressive conjunctival scarring that may result from immunologically mediated responses. The authors studied the processes involved in the regulation of inflammation and fibrosis in trachoma by investigating the expression of fibrogenic cytokines in the conjunctiva.

The authors studied conjunctival biopsy specimens obtained from nine subjects with active trachoma and from four control subjects. They used immunohistochemical techniques and a panel of monoclonal and polyclonal antibodies directed against interleukin-1 α (IL-1 α), interleukin-1 β (IL-1 β), tumor necrosis factor- α (TNF- α) and platelet-derived growth factor (PDGF). In addition, they characterized the composition of the inflammatory infiltrate by the use of a panel of monoclonal antibodies. Sirius red and Van Gieson stains were used to characterize the extent of fibrous tissue in the substantia propria.

Trachoma specimens showed greater numbers of inflammatory cells than control specimens. The expression of cytokines was absent in the normal conjunctiva. Cytoplasmic IL-1 α and IL-1 β expression was noted in the conjunctival epithelium in all trachoma specimens. IL-1 α , IL-1 β , TNF- α and PDGF were detected in macrophages infiltrating the substantia propria. B lymphocytes predominated over T lymphocytes in six trachoma biopsies with fibrosis confined to the deep substantia propria, whereas T lymphocytes predominated over B-lymphocytes in three biopsies with more extensive fibrosis. In all trachoma biopsies helper/inducer T lymphocytes outnumbered suppressor/cytotoxic T lymphocytes.

The authors concluded that unregulated local production of IL- α , IL-1 β , TNF- α and PDGF might contribute to conjunctival damage and scarring in trachoma.

Pseudoexfoliation Syndrome for the Comprehensive Ophthalmologist Intraocular and Systemic Manifestations
Naumann GOH, Schlotzer-Schrehardt U, Kuchle M
Ophthalmology 1998; 105:951-68

Pseudoexfoliation (PEX) syndrome is not only an ocular disease but a generalized disorder involving abnormal production or turnover of extracellular matrix material or both. The exact etiology of this systemic condition remains unknown. Currently, only the intraocular changes can be diagnosed clinically without invasive methods. Renewed interest in this long-known entity results from better awareness of the spectrum of intraocular risks, not only for open-angle glaucoma but also in conjunction with all intraocular surgery, especially cataract extraction. Furthermore, there is an increasing prevalence of PEX as the mean age of the general population increases, yet the clinical implications of the systemic manifestations of this disorder remain unknown.

The purpose of this review was to emphasize two aspects of this common but poorly understood and often overlooked disorder: (1) its intraocular and extraocular manifestations and (2) the resulting clinical complications.

Renewed interest in pseudoexfoliation syndrome (PEX) may be attributed to an increased awareness of many clinical risks not only for open-angle glaucoma and its recent recognition as a generalized disorder. This review summarizes the range of intraocular and extraocular manifestations. Involvement of all tissues of the anterior segment of the eye results in a spectrum of intraocular complications that have management implications for all practicing ophthalmologists.

Clinical diagnosis of pseudoexfoliation depends on biomicroscopy, biocytology, and laser-tyndallometry, while the laboratory research methods range from light and electron microscopy to immunohistochemical and molecular biologic approaches.

Clinical-histopathologic correlations focus on the involvement of lens (PEX-phacopathy), zonular apparatus (zonulopathy), ciliary body (cyclopathy), iris (iridopathy), trabecular meshwork (trabeculopathy) and cornea (corneal endotheliopathy) leading to the following complications: (1) open-angle glaucoma as well as angle-closure glaucoma due to

pupillary and ciliary block; (2) phacodonesis, lens dislocation, and increased incidence of vitreous loss in extracapsular cataract surgery caused by alterations of the zonular apparatus and its insertion into the ciliary body and lens; (3) blood-aqueous barrier breakdown (pseudouveitis), anterior chamber hypoxia, iris stromal hemorrhage, pigment epithelial melanin dispersion, poor or asymmetric pupillary dilatation, and formation of posterior synechiae due to involvement of all cell populations of the iris; and (4) early diffuse corneal endothelial decompensation explained by a damaged and numerically reduced endothelium.

The authors concluded that in view of the multitude of clinical complications, PEX is of relevance to comprehensive ophthalmologists, including specialists in glaucoma, cataract, cornea, neuro-ophthalmology, and retina. Special attention to the risks associated with PEX is advised before, during, and after surgery.

Surgical Results of Combined Trabeculotomy-Trabeculectomy for Developmental Glaucoma
Mandal AK, Naduvilath TJ, Jayagandan A
Ophthalmology 1998; 105: 974-82

The management of congenital glaucoma is primarily surgical, the objective being to normalize and permanently control intraocular pressure (IOP) without the need for any antiglaucoma medication. The classic operation for congenital glaucoma is goniotomy. However, the trend seems to be changing, and there are increasing numbers of advocates for primary trabeculotomy. The reasons underlying this change in trend is that approximately 50% of the patients with congenital glaucoma present with variably opaque media and are therefore unsuitable for goniotomy.

Primary trabeculectomy is not a first-line procedure in congenital glaucoma in view of a higher incidence of complications and lower success rate in normalizing the IOP. In contrast, several published reports have documented successful results following primary trabeculectomy for congenital glaucoma that are comparable to or are higher than the most reported series on goniotomy or trabeculotomy.

The purpose of this study was to evaluate the surgical outcome of combined trabeculotomy-trabeculectomy in different types of primary developmental glaucomas.

A retrospective review of all cases of primary developmental glaucomas that underwent primary combined trabeculotomy-trabeculectomy between August 1990 and September 1995, with a minimum follow-up of 6 months, was performed.

One hundred and eighty-two eyes of 120 patients were included in this study; 122 (67%) eyes had congenital glaucoma; 22 (12.1%) eyes had infantile glaucoma; and 38 (20.9%) eyes had juvenile glaucoma. Primary combined trabeculotomy-trabeculectomy was the chosen intervention. Preoperative and postoperative intraocular pressures, visual acuities, success rate, corneal clarity and diameters, bleb characteristics, time of surgical failure, and complications were the main outcome measures.

Intraocular pressure (mean $\pm$ SD) reduced from a preoperative level of 26.5 $\pm$ 8.3 mmHg; 30.3 $\pm$ 9.9 mmHg; and 31.8 $\pm$ 11.5 mmHg to 13.1 $\pm$ 5.8 mmHg; 13.7 $\pm$ 4.4 mmHg; and 13.3 $\pm$ 6.0 mmHg in the congenital, infantile, and juvenile types of developmental glaucomas, respectively. Kaplan-Meier survival analysis showed that the success probability at 6 months was 94.4% $\pm$ 2.3%; 90.9% $\pm$ 6.1%; and 81.0% $\pm$ 7.3% in the three groups, respectively. The success probability of patients with juvenile glaucoma was significantly lower than it was for those with congenital glaucoma ($p = 0.0393$). Of 182 eyes, 105 (57.7%) eyes had corneal edema at presentation. Eighty-one (79%) of 105 eyes had complete clearance of corneal edema postoperatively ($p < 0.0001$). The follow-up period ranged from 6 months to 48 months (mean, 10.7 $\pm$ 12.0 months). There were no sight-threatening intraoperative and postoperative complications in any patient.

The authors concluded that the primary combined trabeculotomy-trabeculectomy is safe, effective, and sufficiently predictable to be considered the first choice of surgical treatment in primary congenital glaucoma with corneal edema. Juvenile glaucoma has the worst prognosis, and infantile glaucoma has a better prognosis than does juvenile glaucoma.

Frequency of Asymmetric Visual Field Defects in Normal-tension and High-tension Glaucoma

Poinoosawmy D, Fontana L, Wu JX, Bunce CV, Hitchings RA
Ophthalmology 1998; 105: 988-91

Patients with primary open-angle glaucoma (POAG), whether it is high-tension glaucoma (HTG) or normal-tension glaucoma (NTG), frequently present with visual field loss in both eyes at the time

of diagnosis. However, the two eyes often present with a variable degree of asymmetry in field damage, while in some patients, the field loss may be localized to one eye only at presentation. Although estimates of the frequency of unilateral field loss cases in POAG vary greatly according to different studies, Levene, in an extensive review of the literature based on 1008 NTG patients, concluded that unilateral field loss cases are more frequently seen in NTG than in HTG.

The purpose of this study was to evaluate the frequency of asymmetric visual field loss at presentation in patients with normal-tension glaucoma (NTG) and high-tension glaucoma (HTG)

A retrospective cross-sectional study design was used. Four hundred and three NTG patients and 337 consecutive HTG patients were included in this study (diagnosed between 1986 and 1996).

Analysis of the frequency of unilateral field loss presentations in NTG and HTG was done. The visual fields of fellow eyes were compared to determine the side of more severe field loss. For the NTG patients, the relationship between the side with greater field loss and corresponding intraocular pressure (IOP) was investigated. Humphrey field analyzer mean defect (MD) and mean diurnal IOP were the main outcome measures.

In the NTG group, 101 (25%) patients presented with unilateral field loss. The proportion of cases with unilateral field loss decreased with increasing age of presentation (chi-square test for trend = 26.9; $p < 0.0001$). Sixty-four percent of the patients had unilateral field loss in the left eye. Sixty-eight percent of the cases with bilateral field loss had a higher MD in the left eye. The diurnal IOP was estimated as 0.23 $\pm$ 0.068 mmHg (mean $\pm$ SE) higher in the left eye ($p = 0.001$). In the HTG group, 104 (31%) patients presented with unilateral field loss. The proportion of cases with unilateral field loss decreased with increasing age of presentation (chi-square test for trend = 4.6; $p = 0.03$). Right and left eyes had an equal chance of having field loss in unilateral cases and of being the side of more advanced field damage in bilateral cases.

The authors concluded that frequency of cases with unilateral field loss was similar in HTG and NTG patients. Patients with unilateral field loss at presentation were more likely to be at the younger end of the age range. In the NTG population the authors studied that the left eye was more frequently the side

of onset of field loss and 2.1 times more likely to present with a greater field defect than the right eye. In HTG patients, right and left eyes showed an equal chance of being the side of onset of field damage and the more affected side.

Long-term Postoperative Results of a Consecutive Series of Stages 4 and 5 Retinopathy of Prematurity

Trese MT, Droste PJ,

Ophthalmology 1998; 105: 992-7

Several authors have described their experience relative to the management of stage 4 and 5 retinopathy of prematurity (ROP). This article describes a consecutive retrospectively analyzed series of patients with stages 4 and 5 ROP treated by one pediatric ophthalmologist and one vitreoretinal surgeon. The children were treated in a consistent manner, and referral of patients was done in a timely fashion, allowing early intervention. The goal was to see whether such an organized and deliberate attempt for aggressive screening, early intervention, and intensive postoperative management could yield functional visual results.

The purpose of the study was to assess the long-term, anatomic, and functional results of a consecutive series of stages 4 and 5 retinopathy of prematurity (ROP) eyes after surgical management. A retrospective analysis of 42 eyes of 21 children yielded 34 eyes of 19 children who were operated on for stages 4 and 5 ROP. In 33 of 34 eyes, it was possible to have age-appropriate vision testing. The children were followed for a mean of 44 months.

Seventy-six percent of eyes (25 of 33) in which vision testing was possible had partial or complete attachment of the posterior pole. Fifteen percent of all eyes achieved 20/300 or better visual acuity. Thirty percent of all eyes achieved 20/800 or better visual acuity. Forty-eight percent of eyes achieved ambulatory vision of 20/1900 visual acuity or better, and 72% of eyes achieved light perception or better vision. All eyes were managed similarly for their preoperative screening, surgical therapy, and postoperative refractive correction by one vitreoretinal surgeon and one pediatric ophthalmologist.

The authors concluded that timely surgical intervention and appropriate postoperative care can result in useful vision in stages 4 and 5 ROP.

Ophthalmic "Pastpourri"

Benevolent Ben

The Story of Bifocals

Benjamin Franklin would have been amused by any discussion of his priority to the invention of bifocals. Whatever his faults, Franklin was never small or mean. To him the important thing was always the idea and then its application for the good of all. Personalities rarely entered into his calculations. He never sought status for himself in the fields of science and invention; he never attempted to gain wealth from any of his ideas. His stove and his lightning rod, both excellent business ideas for his day, he freely shared with the world by publishing full descriptions of them and how they could be manufactured and used. Others got rich from the ideas, not Franklin.

Several of his inventions, or gadgets as they are sometimes termed, were to him simply devices to make life easier for him--his book hook, his letter copier, his chair ladder are examples. And in his mind his double spectacles were in this category: only another thing to make life easier for an old man--another thing to be freely shared with all old men so that their lives might be made easier.

Jehangir Durrani
MD, FACS, FRC OPHTH

Snyder C. Our Ophthalmic Heritage. Little, Brown and Company. Boston. 1967;P92.

News and Events

The Royal college of Ophthalmologists Diploma in Ophthalmology (DRCOphth) Examination

The Royal college of Ophthalmologists has introduced an examination leading to the award of the Diploma in Ophthalmology (DRCOphth). The examination will be held twice a year in June and November. Details are available from:

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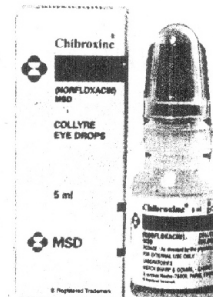
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CHIBROXINE® (norfloxacin, MSD) is a 0.3 percent sterile solution of norfloxacin for topical use in the eye. Norfloxacin is a synthetic fluoroquinolone broad-spectrum antibacterial agent with activity against Gram-positive and Gram-negative aerobic organisms, including gentamicin-resistant *Pseudomonas aeruginosa*. This spectrum includes the majority of organisms which are likely to be involved in superficial infections of the eye or its adnexae. **MICROBIOLOGY:** Norfloxacin has in vitro activity against a broad spectrum of Gram-positive and Gram-negative aerobic and facultative anaerobic bacteria. The fluorine atom at the 6 position provides increased potency against Gram-negative organisms and the piperazine moiety at the 7 position is responsible for antipseudomonal activity. Norfloxacin inhibits bacterial deoxyribonucleic acid synthesis and is bactericidal. At the molecular level three specific events are attributed to norfloxacin in *E. coli* cells: 1) inhibition of the ATP-dependent DNA supercoiling reaction catalyzed by DNA gyrase, 2) inhibition of the relaxation of supercoiled DNA, 3) promotion of double-stranded DNA breakage. Resistance to norfloxacin due to spontaneous mutation is a rare occurrence (range, 10^{-7} – 10^{-8}). There is generally no cross-resistance between norfloxacin and structurally unrelated antibacterial agents. Therefore, norfloxacin generally demonstrates activity against indicated organisms resistant to the aminoglycosides (including gentamicin), penicillins, cephalosporins, tetracyclines, macrolides, and sulfonamides (includes combinations such as cotrimoxazole). In addition, because of its specific structure, norfloxacin is generally active against organisms that are resistant to other organic acids, such as nalidixic, oxolinic and pipemidic acids, cinoxacin and flumequine. Organisms resistant to norfloxacin in vitro are also resistant to these organic acids. Other studies suggest that norfloxacin-resistant organisms are also generally resistant to pefloxacin, ofloxacin, ciprofloxacin, enoxacin and amifloxacin. In vitro studies have demonstrated the susceptibility of most strains of the following aerobic and facultative anaerobic organisms (organisms marked by the symbol + are those pathogens most frequently involved in superficial infections of the eye or its adnexae): **Gram-positive bacteria** including: + *Staphylococcus aureus* (penicillinase-producing, non-penicillinase-producing and methicillin-resistant strains), + *Staphylococcus epidermidis*, *Staphylococcus saprophyticus*, + *Streptococcus* sp. Group A and B, *Streptococcus faecalis* (enterococcus), + *Streptococcus pneumoniae*, *Bacillus cereus*, *Micrococcus* species. **Gram-negative bacteria** including: *Acinetobacter calcoaceticus*, *Aeromonas* species, *Alcaligenes* species, *Campylobacter* species, *Citrobacter diversus*, *Citrobacter freundii*, *Edwardsiella tarda*, *Enterobacter aerogenes*, *Enterobacter cloacae*, *Escherichia coli*, *Flavobacterium* species, *Haemophilus influenzae*, *H. aegyptius* (Koch-Weeks Bacillus), *Klebsiella oxytoca*, *Klebsiella pneumoniae*, *Klebsiella rhinoscleromatis*, + *Moraxella* species, *Morganella morganii*, + *Nisseria gonorrhoeae*, *Proteus mirabilis*, *Proteus vulgaris*, *Providencia alcalifaciens*, *Providencia rettgeri*, *Providencia stuartii*, + *Pseudomonas aeruginosa*, *Salmonella typhi*, *Salmonella* species, *Serratia marcescens*, *Shigella* species, *Vibrio cholerae*, *Vibrio parahaemolyticus*, *Yersinia enterocolitica*. Norfloxacin is not active against obligate anaerobes. **INDICATIONS:** CHIBROXINE is indicated in adults and children for the treatment of superficial infections of the eye and its adnexae, presumed or demonstrated to be caused by pathogenic bacteria susceptible to norfloxacin. **DOSAGE AND ADMINISTRATION:** The usual dose is one or two drops of CHIBROXINE in the affected eye(s) four times daily. Depending on the severity of the infection, the dosage for the first day or therapy may be one or two drops every two hours during the waking hours. Appropriate monitoring of bacterial response to topical antibiotic therapy should accompany the use of CHIBROXINE. **CONTRAINDICATIONS:** CHIBROXINE is contraindicated in patients with known hypersensitivity to any component of this product or any chemically related quinolone antibacterial agent. **PRECAUTIONS:** **PREGNANCY:** CHIBROXINE has not been studied in human pregnancy. Therefore, CHIBROXINE should be given to a pregnant woman only if clearly needed. **NURSING MOTHERS:** It is not known whether norfloxacin is excreted in human milk following ocular administration. **SIDE EFFECT:** In clinical trials, CHIBROXINE was generally well tolerated. The most frequently reported side effect was local burning or stinging, other drug-related side effects, reported rarely, were conjunctival hyperemia, chemosis, photophobia and a bitter taste following instillation. **AVAILABILITY:** Chibroxine Ophthalmic Solution 0.3% is available in 5 ml dispenser with metered tip. **STORAGE:** Protect from light. Store at room temperature. *Trademark Physicians Circular

† Registered Trademark of MERCK & CO., INC., Whitehouse Station, N.J., U.S.A.



10-89-CRI-98-MEA-65-J (PK)

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FOR THE BROAD COVERAGE OF
PATHOGENS IN OPHTHALMOLOGY

Chibroxine[®]
(norfloxacin, MSD)

STERILE OPHTHALMIC SOLUTION

Indicated for conjunctivitis and
other superficial infections of the
eye and its adnexae caused by
bacteria susceptible to norfloxacin.

- Broad spectrum
- High potency
- Bactericidal action
- Clinically effective
- Favorable tolerability profile
- Can be used in
children and adults
- Easy to use



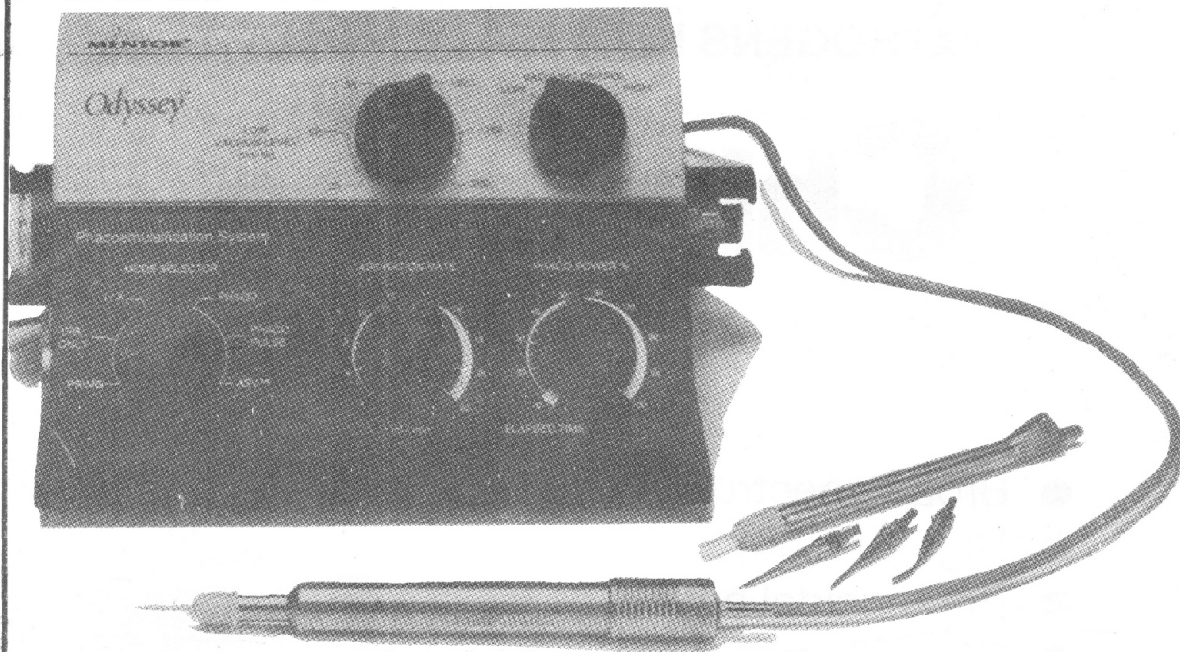
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01-97-CRI-96-MEA-I-J (PK)

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- Unparalleled fluidics control through unique mini-peristaltic pump
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Bacterial Conjunctivitis

Quality Assured
Ophthalmic Preparations
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manufacturers of quality
ophthalmic preparations.*

ANTIGLAUCOMA			
BLOTIM 0.25%	Ophthalmic Solution	Timolol Maleate 0.25%	5 ml
BLOTIM 0.50%	Ophthalmic Solution	Timolol Maleate 0.50%	5 ml
NON STEROIDAL ANTI-INFLAMMATORY AGENT			
KONAC	Ophthalmic Solution	Diclofenac Sodium 0.10%	5 ml
STERIODS			
EYFEM	Ophthalmic Suspension	Fluorometholone 0.10%	5 ml
FORTIPRED	Ophthalmic Suspension	Prednisolone Acetate 1.00%	5 ml
MILDOPRED	Ophthalmic Suspension	Prednisolone Acetate 0.12%	5 ml
STERIODS + ANTI-INFECTIVES			
BIOFPRED	Ophthalmic Suspension	Prednisolone Acetate 0.5% Neomycin Sulphate 0.5% (equivalent to Neomycin base 0.35%) Polymyxin B Sulphate 10,000 units.	5 ml
MYDOSONE	Ophthalmic Suspension	Prednisolone Acetate 0.25% Sulphacetamide Sodium 10%	5 ml
STERIODS + DECONGESTANT			
FEMICON	Ophthalmic Suspension	Fluorometholone 0.1% Tetrahydrozoline HCl 0.025%	5 ml
ANTI-INFECTIVES			
BACTINOR	Ophthalmic Solution	Norfloxacin 0.3%	5 ml
BIOSAT	Ophthalmic Solution	Chloramphenicol 0.5% Boric Acid 0.15%	15 ml
NEBRA	Ophthalmic Solution	Tobramycin 0.3%	5 ml
NEBRA	Ophthalmic Ointment	Tobramycin 0.3%	5 gm
ROCIP	Ophthalmic Solution	Ciprofloxacin 0.3%	5 ml
ANTI-ALLERGIC/MAST CELL STABILIZER + DECONGESTANT			
DECON-A	Ophthalmic Solution	Pyrimamine Maleate 0.1% Phenylephrine HCl 0.12% with Antipyrine	15 ml
HISTALYN 2%	Ophthalmic Solution	Sodium Cromoglycate 2%	5 ml
HISTALYN 4%	Ophthalmic Solution	Sodium Cromoglycate 4%	10 ml
HISTAZOLIN	Ophthalmic Solution	Sodium Cromoglycate 4% Tetrahydrozoline HCl 0.05%	15 ml

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New PASSPORT® Foldable IOL Placement System eliminates reasons for rigid thinking.

Now you have every reason to switch to foldable lenses. Because the new PASSPORT System and Chiroflex® Series Lenses put greater control and simplicity at your fingertips.

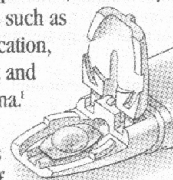
Minimally invasive, the PASSPORT System transition cell slips through an incision smaller than that needed with any other lens delivery device, minimizing the potential for astigmatic shift.

A single-piece, plate haptic design allows the Chiroflex Series Lens to establish a posterior position, which may reduce complications such as capsular opacification, retinal detachment and cystoid macular edema.¹ With the PASSPORT System, Chiron Vision sets its sights on a higher level of IOL placement performance. You can also look forward to the introduction of a wide array of innovative new products. All representing advanced IOL technology aimed at bringing you into the Chiron Vision fold.

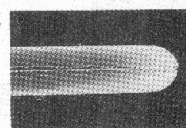
For more information, call 800-843-1137 or 909-624-2020.



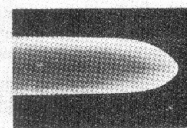
Single-piece, plate haptic lenses provide improved placement integrity over multipiece lenses.



The foldable lens is easily placed into the recessed lens loading deck.



Non-Tumble-Polished Plate Haptic Lens 100x magnification; side view of plate.



Chiroflex Plate Haptic, Tumble-Polished Lens (patented). 100x magnification; side view of plate.

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Nikon

Hand Held Ref

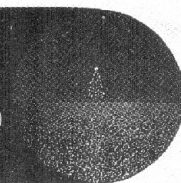
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The Picture Target

The Xmas tree target is easy for both children and adults to understand.

Wide Measurement Range

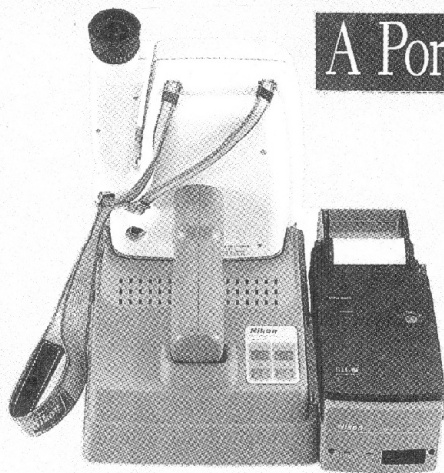
A wide reading range of (s+c) -18 ~ +22D and (c) $\pm$ 8D permits readings from many different types of patients.



A Portable Revolution in Eye Examination

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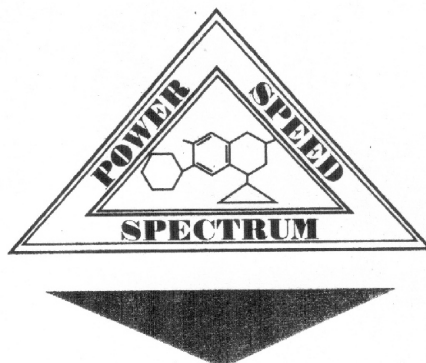
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Sterile Ophthalmic Solution

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A broad spectrum of activity against important ocular pathogens

POWER

The power to treat even the toughest ocular infections

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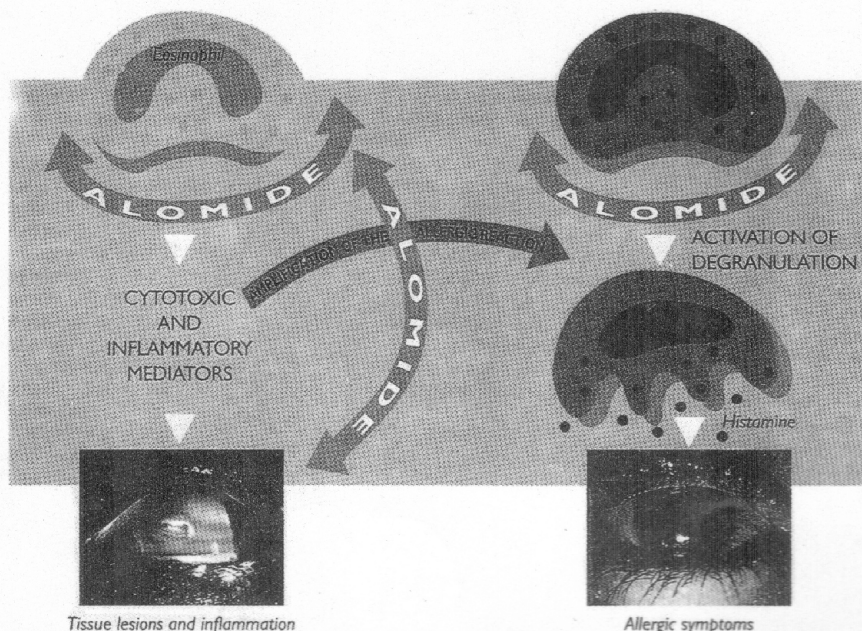
Rapid resolution of serious ocular infections

Alcon
INTERNATIONAL

UNCOVER THE 90 DAYS SOLUTION
IN VERNAL CONJUNCTIVITIS WITH


ALOMIDE®
Lodoxamide tromethamine 0.1% Ophthalmic Solution

MAST CELL - EOSINOPHILS INHIBITOR



Conventional therapy like Disodium Chromoglycate (DSCG) only acts on mast cells and leaves the Eosinophils untouched which are responsible for allergic tissue lesions and also collaborates with mast cells in intensifying the allergic reaction, ultimately prolongs the treatment.

DUAL ACTION

ALOMIDE

- ▷ INHIBITS MAST CELL DEGRANULATION
- ▷ INHIBITS EOSINOPHILS MIGRATION.

REDUCES THE DURATION AND COST OF TREATMENT.
ALOMIDE CAN BE USED FOUR TIMES DAILY FOR UPTO 90 DAYS.

THE NEW STANDARD IN TREATMENT
OF OCULAR ALLERGIES.