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At Page 45 Figures 2 & 4: Neurofibroma of upper lid before and after surgery

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Editorial

Phacoemulsification: To convert, or not to convert?

A modern-day dilemma

At one time or another in our lives, we mortals are faced with critical situations which may sometimes call for monumental decisions with dire consequences. One such situation was faced by the pathetic prince of Denmark--Hamlet--who became so despondent when he learnt that his dear father, the king, had not died a natural death, but likely was murdered by his uncle with the connivance of the queen. He became so morose that he considered his dilemma thusly: "To be, or not to be: That is the question"[1].

We ophthalmologists, are, at present, facing a dilemma of our own. Even though it does not have the portentous proportions of the classic dilemma of Hamlet, being of a more mundane nature, it nevertheless is of sufficient significance as to deserve our serious consideration for a thoughtful analysis. Our quandary is: To convert, or not to convert to phacoemulsification? This is not the first time, however, that we are poised on the horns of a dilemma in recent times. Having developed the technique of intracapsular cataract extraction (ICCE) over the last one hundred years, sliding and tumbling the cataract with the Arruga forceps, erisiphakes and finally with cryoprobes and proteolytic enzymes to lyse the zonule, we thought we had achieved the ultimate in perfecting the procedure[2]. Suddenly we were unsettled when it was shown beyond the shadow of doubt that extracapsular cataract extraction (ECCE) was safer than ICCE in many ways, not the least of which was reduced incidence of problems associated with a disturbed vitreous face while doing an ICCE. Many of us still had not recovered from the shock of this revelation which was forcing our hands to convert to ECCE, when intraocular lenses (IOLs) were proven to be the superior prostheses to spectacle or contact lens corrections for aphakic patients, merely about three decades ago. And now this--the phacoemulsification! Where will it all end? And will it ever? Hopefully, never ever will this pursuit of excellence end.

Over a score years in the U.S.A, since Kelman, in 1967, introduced the revolutionary idea of removing the cataract through a small incision by emulsifying it with an ultrasonic probe[3], the percentage of phaco converts has progressively advanced from 15% in the early 1970s to around 85% presently. And most phaco converts emulsify over 95% of their cataracts. Why this upsurge? The obvious and proven major reasons are the rapid systemic and visual rehabilitation and lack of induced astigmatism of any significance, especially when combined with a self-sealing sutureless corneal-valve incision and a foldable IOL.

See also pp.....32-43

Whenever a new idea or technique is promoted, a predictable response to it is resistance. Basically, such response originates from inertia and from the fear of the unknown. These are the manifestations of one of a lesser known of Murphy's laws governing human nature: "If it ain't broke, don't fix it". Had we subscribed to such philosophy, we would still be couching the cataracts as practiced by Susruta[4], circa 600 BC, or perhaps be stuck at any of the stages of development of techniques in this regard popularized by Daviel, von Graefe, Colonel Smith, Barraquer, Arruga, Ridley, Krawawicz and Binkhorst[5]. Only the dare and wherewithal of these pioneers has led to the continual improvement of the techniques and technologies in cataract extraction. The present era belongs to Kelman and his phacoemulsification and the foldable IOL.

Not too long ago, some of our patients, at least those who could afford it, used to go abroad to have ECCE with IOL done. Who would want to do that now that the choice is available, and we have been doing such a good job, right here? The resistance and opposition some of us met in those times of transition are still fresh in our memories. Aren't we having a deja vu? Do we want our patients to go the same route they went before? The answer is: Certainly not. Converting to phaco is not just a matter of keeping up with the Joneses. Not even of financial survival. It is a matter of shaking off inertia, striving to be better craftsmen.

keeping abreast of the technological innovations and providing the best possible services to our patients, right here, at home.

The related articles in this issue of the Journal present the two extremes of experience in this regard--those of novice surgeons in their "learning curve", and those of a master surgeon, who is willing to test his skills in uncharted seas, so to speak, without jeopardizing the patients' welfare, however. Hopefully, these articles will help those sitting on the fence, teeter the way of the phaco by showing them where they can get, from where they are. Only if they would not succumb to inertia!

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Jehangir Durrani

Phacoemulsification

Results and Complications During the Learning Curve

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ABSTRACT

Small incision cataract surgery allows for early rehabilitation of patients and improved control of postoperative astigmatism[1]. Even in good training centres, the initial complications for the first 100 cases range from high to fairly high[2]. This paper deals with the visual outcome and complications that occurred in our first 150 cases and how they could have been minimised. 121 patients regained visual acuity of 6/12 or better without any correction. Only 13 patients required correction. The astigmatism was noticeably very low and the required astigmatic correction was in the order of + / - 0.75 D cyl. 12 patients had posterior capsular rupture and 8 patients developed corneal oedema. Dislocation of the nucleus occurred in one case. There was a rise of intraocular pressure in one of the cases and, therefore, intraocular lens placement was aborted.

INTRODUCTION

Small incision cataract surgery leads to much reduced postoperative astigmatism, much less inflammation and very rapid and complete visual and systemic rehabilitation. It is usually performed under local anaesthesia, either with periocular infiltration or a retrobulbar injection. Because of these advantages, phacoemulsification is accepted by surgeons throughout the world "as the procedure of choice", but convertibility rate is very slow.

The first phacoemulsification procedure was carried out by Charles Kelman in 1966[3]. The main reason behind introducing phacoemulsification was , to reduce the convalescent period by reducing the size of the incision, which was 180° for routine intracapsular cataract extractions at that time. The idea could not gain popularity, because of the high rate of complications. But with the advent of improved microsurgical techniques, description of capsulorrhexis by Neuhann and Gimbel[4] and with the availability of better viscoelastic materials, which provide better protection to the endothelium during posterior chamber phacoemulsification[5], the idea was revived. Still, it took a very long time to be eventually accepted as the procedure of choice by the majority of ophthalmic surgeons[6]. The main reason for conservative approach towards this procedure is the long and sometimes difficult learning curve, while the cost and lack of high technological backup are also factors[7]. Extracapsular cataract extraction (ECCE) with posterior chamber intraocular lens implantation is the most popular method of cataract extraction in the UK at present, with proven track record of success[8].

PATIENTS AND METHODS

The results and complications in the first 150 cases undergoing phacoemulsification, with intraocular lens implantation, were analysed. This being the conversion period from the standard extracapsular extraction (ECE) to phacoemulsification, it was presumed that complication rate will be higher. Cooperative patients between 25 - 65 years of age were selected (Table 1).

Table 1: Demographics

Age group: 20-65 years	
Males	74
Females	76

PREOPERATIVE ASSESSMENT

The patients were assessed for suitability for the procedure. Cooperative, relatively young, understanding patients, who had been controlled for diabetes and hypertension and had no cardiac problems, were chosen.

Ocular slit-lamp biomicroscopy with 90D or 78D lens was performed. Applanation tonometry with Goldmann applanation tonometer was done. Fundus examination, wherever possible, was carried out.

Nuclear hardness was graded as +1 to +4; +1 being soft nuclei, and +4 being very hard nuclei. Being the conversion phase, patients having corneal dystrophies, uveitis, high myopia or those having pseudoexfoliation syndrome, were not included in this series. Although very hard lenses are better avoided, still this series contained 17 patients with hard nuclei (Table 2).

Table 2: Grades of cataracts.

Total No. of patients	Posterior subcapsular	Nuclear sclerosis +1-+4	Hypermature
150	101	37	12

Full pupillary dilatation was achieved by phenylephrine 10% and cyclopentolate 1%, every 15 minutes, one hour before surgery.

ANESTHESIA

Facial block was achieved with 10 cc of a 1:1 mixture of Xylocaine 2% and Bupivacaine HCL 0.50%. 2 cc of the same mixture was used for retrobulbar block. The eye was massaged for 15 minutes prior to surgery to achieve complete akinesia.

SURGICAL TECHNIQUE

Phacoemulsification was performed under local anesthesia. Two types of tunnel incisions were employed (a) Corneal (b) Scleral. Before making the tunnel, the cornea or the conjunctiva over the sclera was marked with 5mm calipers temporally in the right eye and nasally in the left eye. Tunnel incision was achieved by using 2.2 mm disposable crescent knife. Capsulorrhexis was achieved in 100% of cases, with bent insulin needle. No viscoelastic was used for capsulorrhexis. After completing the capsulorrhexis, the anterior chamber was entered with 3.2 mm keratome. The anterior chamber was then filled with viscoelastic. A side-port incision was made with MVR knife. Phacoemulsification of the nucleus was achieved after dividing the nucleus into two and then into four quadrants and aspirating out the fragments. The remaining lens matter was aspirated with I/A cannula. The posterior capsule was polished. The anterior chamber was filled again with viscoelastic and the wound enlarged to 5.2 mm. Intraocular lens was implanted into the capsular bag. Miosis was achieved with miostat injection. Subconjunctival depomedrol 40 mg and genticyn 40 mg were given. Table-3 shows the settings and the techniques used.

Table 3: Settings and Technique.

TIP	Phaco power for Sculpting	BSS with intracardiac adrenaline	Height of bottle	Incision	IOL
45°	60-70%	Yes	70cms	5mm corneal or scleral tunnel	5,5.2, 5.1mm one-piece

Intraocular Lenses:

Five types of intraocular lenses were used:

a. 5.25mm optic size Alcon PC IOL LX10BD. (Overall length 12mm). 70 cases.
b. 5.1mm optic size Rayner PC IOL 511 A (Overall length 11.5mm). 40 cases.
c. 5.0mm optic size Domilens PC IOL Centra 50B (Overall length 12.5mm). 28 cases.
d. 6.5mm optic size Opsia (Overall length 13.5mm). 10 cases
e. Rayner Anterior chamber intraocular lens. (Overall length 13.5mm). 2 cases.

Sutures:

132 cases were sutureless.
18 cases were given single, criss-cross suture. (Table-4)

Table 4: Wound closure.

Total	Sutures	Sutureless
150	18	132

RESULTS

1. **Visual acuity**
   Of 150 cases who underwent phacoemulsification, 134 patients got vision of 6/12 or better postoperatively. Out of these 121 (80.6%) patients improved their vision without any correction, while 13 (8.6%) patients required correction. The correcting lenses were + / - 1.5 D Sph and only 13 patients required an addition of + / - 0.75 cylindrical correction for their astigmatism.

2. **Posterior capsular rupture**
   The most common complication during this conversion period was rupture of posterior capsule. This occurred in 12 (8%) cases.

3. **Vitreous loss**
   All those patients who had posterior capsule

rupture had vitreous loss. Vitrectomy was achieved using sponge swab, and Vannas scissors, and it was ensured that no vitreous remained in the anterior chamber.

In 10 cases, a 6.5 or 7mm optic lens was implanted in front of the rhexis and two cases were implanted with anterior chamber intraocular lens. These were converted to extracapsular extraction.

4. **Corneal edema**
The second most common complication was corneal edema. Eight cases were found to have mild to moderate corneal edema. The edema cleared within one to two weeks without leaving any sequelae.

5. **Iris chewing**
Five patients had iris chewing.

6. **Nuclear dislocation**
In one case nuclear dislocation occurred when sculpting of the nucleus had just started. The reason, apart from improper patient selection, was that the rhexis was hit directly and the tear extended posteriorly and the nucleus was lost into the vitreous in a split second. Anterior chamber was cleared of cortex and vitreous, and the wound was closed with a suture. The patient was referred to a vitreoretinal surgeon where he was taken care of.

7. **Posterior capsule opacification**
In one-year follow-up, seven cases presented with reduced vision due to posterior capsule opacification. The incidence is no higher than in the standard extracapsular extraction technique. One interesting finding was that with a particular type of IOL, there occurred a fold in the posterior capsule. Out of these seven, five cases were from this group where in-folding of the capsule was responsible for early opacification.

DISCUSSION

There are few studies[9] which describe the complications that occur during the learning curve. We are presenting our own experience of using phaco and have described the complications that occurred in our learning phase. We are comparing it with other surgeons who met the same complications during their phase of learning.

In one series of 111 cases by Olsen et al[10] 69% of patients had a visual acuity of 6/12 or better, which improved to 79% after four months, without any correction. In another series of 400 phacoemulsification procedures on 358 patients by Seward et al[11] the best-corrected visual acuity was 6/9 or better in 83.6% of cases. There was 1 diopter or less change of astigmatism, from the preoperative reading, at 6 weeks postoperatively in 91% of eyes.

In another series by Hussain et al[12], 70% of patients achieved visual acuity of 6/12 or better. In our series, visual outcome of 6/12 or better was noticed in 134 of 150 patients, which is 89.3%. Out of these, 80.6% didn't require any correction. These visual outcomes are comparable to those of other reported series and confirm that changing from routine extracapsular to phacoemulsification need not jeopardize our results.

Astigmatism was measured using refractive cylinder and it was assessed that our 13 patients required an astigmatic correction of + / - 0.75D cylinder.

The most dreaded complication of phacoemulsification is posterior capsular rupture which haunts most of the phaco surgeons during their learning phase. Our series had 12 cases (8%) with posterior capsular rupture. Commonly, the rupture occurred while chasing a piece of nucleus (6 cases). This happened because of not resisting the temptation of chasing the nuclear fragments in semi-dilated pupils.

The other most common cause of rupture was hitting the rhexis directly, while sculpting. The tear extends through the equator and this could lead to a drop of the nucleus into the vitreous. To avoid this complication, one should strictly remain in the iris plane and should learn to engage the nuclear bits by using high vacuum and to keep the rehxis under direct observation. In two cases, the rupture occurred because of sculpting in the mid-peripheral portion of the nucleus, which is relatively thinner as compared to the centre, where the nucleus is the thickest.

In a series of 400 phacoemulsifications on 358 patients by Seward et al[11] capsular tear occurred in 6.3% of cases, vitreous loss in 1.5% of cases and one nucleus was lost into the vitreous.

Cruz et al[13] reported the incidence of posterior capsular rupture as 9.9% in a series of 181 eyes.

In one of our cases, the posterior capsule was ruptured while extending the wound with 5.2mm phakotome. Here, the anterior chamber was not properly filled with viscoelastic and while extending the wound in a shallow anterior chamber, the posterior capsule was directly hit.

So, to avoid this complication, one should:

a. Keep the rhexis under direct observation.
b. Resist the temptation of chasing the nuclear bits.
c. Keep phaco tip always in the iris plane.
d. Use viscoelastic freely.

In all the patients who had posterior capsular rupture, the wound was enlarged to ensure safe delivery of the nucleus. Intraocular lens was implanted after a proper vitrectomy. In one series, Allinson et al[9] reported 136 cases, who underwent phacoemulsification by six third-year residents. The incidence of vitreous loss was 14.7%. In another series of 50 cases, Prince et al,[14] noted that the most frequent complication was corneal oedema lasting for one week.

In our series iris chewing was noticed in 5 cases. Their regular visits at postoperative follow-ups constantly brought back the unpleasant memories of how difficult it was to phaco in those cases. The reason for iris chewing was either the semi-dilated pupil (3 cases), or the chasing of the nuclear fragments (2 cases). Although this does not affect the visual outcome, still this complication can be avoided mostly by achieving full dilatation of the pupil.

Posterior nuclear dislocation is a serious complication of cataract surgery, especially when using the phacoemulsification technique. So far, there have been only a few reports concerning the indications and timing of vitrectomy with nuclear removal as well as long-term visual outcome in these eyes. In one study, Tommila et al[15] analysed 23 consecutive patients who underwent vitrectomy following nuclear dislocation into the vitreous. All had raised intraocular pressure before vitrectomy, 63% had corneal edema, 67% had marked uveitis and 26% had either retinal tear or detachment. Vitrectomy was done within one week. In 14 eyes (61%) the final visual acuity was 6/12 or better. Main reason for poor visual outcome was retinal detachment (9%). In another study of 56 eyes by Gilliland et al[16] resulting complications from retained lens material included glaucoma (52%) corneal oedema (46%), uveitis (56%) and decreased vision (100%). Vitrectomy allowed rapid visual restoration, enhanced resolution of uveitis, and improved the control of glaucoma.

CONCLUSION

The fundamental goal of phacoemulsification is to remove cataract with a minimum disturbance to the eye, to get near normal visual acuity on the second day of surgery and early rehabilitation. This can be achieved by the least manipulation during surgery. The most common complications of posterior capsule tear and vitreous loss can largely be overcome by curbing the temptation to chase the nuclear fragments. The single most important procedure to achieve a good result is good capsulorrhexis and one should put in extra effort to learn it. While doing routine extracapsular extraction, one should try capsulorrhexis on every patient. The second most important thing is to keep pupil fully dilated. One should never try phacoemulsification on semi-dilated pupil, as without direct visualisation of the lens, the probe could do collateral damage to non-target tissues, such as the iris or the posterior capsule. Viscoelastic should be used more frequently and freely.

In the learning phase, the surgeon must avoid phacoemulsification in an eye with a very shallow anterior chamber or cloudy cornea. Dark, brunescent lens should be avoided and rather removed with routine, planned extracapsular extraction procedure.

The phaco surgeon must understand all features of the phaco unit, in order to avoid complications and, moreover, to take advantage of the whole spectrum of instrument variables available.

It is concluded that phacoemulsification with careful patient selection, in skilled hands, can be a safe procedure, even during the learning curve.

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Review Of 100 Cases of Phacoemulsification

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ABSTRACT

Results of 100 cases of phacoemulsification are presented. 67 were phaco with IOL and 33 without IOL. Out of 67 patients of phaco with IOLs, 62 had 5.0-5.5mm, one-piece PMMA lenses and in 5, foldable lenses were implanted. Best-corrected visual acuity between 6/6 and 6/12 was achieved in 58% of patients with IOLs and 48% of patients without IOLs. Visual acuity of 6/18 was achieved in 18% of patients with IOLs and 35% of patients without IOLs. Common complications encountered were corneal oedema, uveitis and posterior capsule rupture.

INTRODUCTION

Phacoemulsification, the exciting innovation was introduced by Kelman in 1967. It permits the removal of a cataract through a 3 mm incision, thus eliminating some of the complications of wound healing related to large incision cataract surgery, and perhaps shortening the recovery period[1]. Small incision cataract surgery significantly benefits the patients and saves health care costs. The small incision allows for faster physical rehabilitation, thus enabling the younger patients to return to full productivity quicker. It has also been reported to reduce postoperative inflammation and induced astigmatism, allowing for earlier refractive stability[2]. Originally designed for use with soft foldable intraocular lenses, sutureless wounds are now used also with rigid small (5 mm) diameter lenses during phacoemulsification[3].

PATIENTS AND METHODS

This study was conducted at the Institute of Ophthalmology, King Edward Medical College, Lahore, from January 1996 to November 1996. Evaluation of the results of 100 cases of phacoemulsification was done. Patients with prominent eyes, clear corneas and nucleus Grades from I to IV were selected (Table-1). It was also ensured that pupils could be dilated maximally. Patients with dislocated or subluxated lenses, mature cataracts, pseudoexfoliation and diabetics, myopes and those in whom full dilation of pupils could not be achieved were avoided.

Patients were divided into three groups (Table-2). Group-I comprised 33 patients who had phacoemulsification without an IOL implantation. Group-II included 62 cases who had phaco with 5.0-5.5mm optic diameter PMMA IOL implantation and in Group-III, the patients had phaco with foldable IOL implants. The phaco machine used was Storz Protege with a venturi pump. Other important instruments used were crescent knife 15°, 3.25mm and 5.25mm disposable keratome, dialer or neuleus rotator. The IOLs used were 5.0mm-5.5mm, PMMA, biconvex, single-piece round lenses. Foldable lenses used were of silicon plate haptic design.

Table 1: Selection of cases.

Grade	No. of patients	Percentage
I	01	01
II	55	55
III	40	40
IV	04	04
Total	**100**	**100**

Table 2: Cataract extraction with phacoemulsification

		No. of cases
Without IOL	(Group I)	33
With IOL		67
a. 5.0-5.5mm PMMA IOL	(Group II)	62
b. Silicon Foldable	(Group III)	05

In Group-I, the incision site in all patients was at 11:00 position. In all patients 3.2mm straight incision

was made posterior to the surgical limbus with No.11 Bard Parker blade. Scleral tunnel of 2-3mm length, carried to about 1mm in the corneal stroma, was made with a crescent knife. Continuous Curvilinear Capsulorrhexix (CCC) was performed with a bent 26 guage needle through a separate incision made 3mm on the right side of the corneal tunnel after filling the A.C. with 2% methylcellulose. A 2mm side-port incision for a second instrument was made at 2:00 position. Entry into the A.C. was performed with a 3.2mm disposable keratome keeping the keratome horizontal with the iris plane, thus creating a corneal-valve type of incision into the A.C. hydrodissection and hydrodelineation were performed with a 23 guage cannula attached to a 5cc syringe filled with Ringer's Lactate Solution. Endocapsular phacoemulsification and aspiration of the nucleus were carried out. Residual cortical matter was aspirated through a manual Simcoe cannula. The wound was left unsutured.

In Group-II, the cataract removal was performed in the same fashion as in patients in Group-I. The section was then enlarged to 5.2mm and a 5.0mm or 5.2mm optical size PMMA IOL was implanted in the capsular bag. Viscoelastic was irrigated and miostat was injected to achieve miosis. No suture was applied.

In Group-III, the cataract removal was performed in the same manner as in Groups I & II. Plate haptic foldable IOL was implanted without enlarging the incision through a special injector. Viscoelastic was irrigated and miostat was injected. Wound was left unsutured.

Subconjunctival injection of 20mg Gentamicin and 2mg Dexamethasone was given. Oral antibiotics were given for 5 days and topical antibiotics and steroids were given for 6-8 weeks. The postoperative visits were at 1,2,4,6 and 8 weeks. At each visit unaided and pinhole vision were recorded. Refraction was done at the 8th week.

RESULTS

Results of 100 cases of phacoemulsification are presented. All the patients completed the follow-up. Preoperative visual acuity varied from HM to 6/12 (Table-3) Postoperative visual acuity was between 6/18 to 6/6 in a majority of cases in all groups (Tables 4 & 5).

Postoperative astigmatism in patients with 5.0-5.5 mm IOL was 0.0 to 2.0 D (Table-6). In patients who had foldable lens implant, it was between 0.0 to 1.0 D (Table-7) and in patients without IOLs the astigmatism varied from 0.5 D to 2.0 D (Table-8).

Table 3: Preoperative visual acuity (V.A.)

V.A.	No. of cases
PL-HM	07
CF	52
6/24-6/12	41

Table 4: Postoperative V.A. with IOL (67 patients).

V.A	No. of patients	Percentage
6/6-6/12	39	58
6/18	12	18
< 6/18	16	24

Table 5: Corrected postoperative V.A. in patients without IOLs (23 cases).

V.A	No. of patients	Percentage
6/6-6/12	11	48
6/18	08	35
< 6/18	04	17

Table 6: Postoperative astigmatism with 5.0-5.5 PMMA IOLs. (62 patients)

Astigmatism	No. of patients	Percentage
0.00 D	9	15
0.25-0.5 D	15	24
0.62-1.0 D	20	32
1.12-1.5 D	14	23
1.62-2.0 D	04	6

Table 7: Postoperative astigmatism with foldable IOLs (5 patients).

Astigmatism	No. of cases	Percentage
0.00 D	2	40
0.25-0.5 D	2	40
0.62-1.0 D	1	20

Table 8: Postoperative astigmatism without IOL (23 patients).

Astigmatism	No. of cases	Percentage
0.12-0.5 D	9	39
0.62-1.0 D	3	13
1.12-1.5 D	8	35
1.62-2.0 D	3	13

COMPLICATIONS

Corneal oedema was the commonest complication encountered. Incidence was 15%. However, in all the patients oedema subsided after one week. 8% had uveitis. Posterior capsular rent was seen in 7% and 2% of patients had iris damage. In these patients the pupil constricted during surgery. One patient had collapsed A.C. on the 1st postoperative day. Zonular dehiscence at 5 O'Clock was encountered in one case. One patient had ptosis and ophthalmoplegia on the first postoperative day, which, however, recovered after two days. In one case, the nucleus was lost into the vitreous (Table-9).

DISCUSSION

Phacoemulsification has definite advantages over planned extracapsular cataract extraction (ECCE). Smaller incision results in shorter hospital stay, early unrestricted physical activity after surgery, early visual recovery, decreased postoperative astigmatism and decreased postoperative scarring of conjunctiva and sclera.

Tunnel incision provides more secure wound closure. CCC provides smooth capsular margin with no capsular tags.

Better maintained AC allows better cortical clean-up and less incidence of posterior capsular tear. In the event of posterior capsular tear closed chamber allows better vitreous clean-up and less vitreous disturbance.

Other important-to-mention advantages of phacoemulsification are decreased operative time and decreased postoperative reaction.

Complications like corneal decompensation, bullous keratopathy, iris trauma, dislocation of lens into the vitreous, vitreous loss following capsular rupture or zonular dialysis, which are frequent during learning phase, can be avoided by preventive measures.

Preventive measures which ensure smooth transition to phacoemulsification are adequate caution, proper tunnel construction, phaco in central 5-6mm to prevent iris trauma, inserting ultrasonic tip with bevel downwards, use of good viscoelastic, conversion to ECCE if phaco time is greater than 7-8 minutes. Last but not the least points are to avoid phaco posterior to the nucleus and never to do phaco in the anterior chamber.

CONCLUSION

The contribution of Charles Kleman in introducing and developing phacoemulsification has enabled surgeons to perform what amounts to an almost atraumatic procedure, and a surgeon can take full advantage of the benefits of small incision surgery. Phacoemulsification permits the removal of a cataract through a 3mm incision, thus eliminating some of the complications of wound healing related to large incision cataract surgery, hence shortening the recovery period. There is significantly less surgically induced against-the-rule astigmatism than with a planned ECCE. Silicon IOL implantation through a 3.2mm incision, and 5.0mm PMMA IOL implanted through 5.2mm incision produce satisfactory results, but the 3.2mm incision showed faster recovery and less induced astigmatism. 3.2mm incision suggests that the "smaller the incision, the safer the surgery", with rapid visual recovery and greater wound stability, especially in the early postoperative period. Finally, surgeons can take full advantage of the benefits that modern, small incision cataract surgery provides for their patients.

Table 9 Complications.

Complication	No. of patients	Percentage
1. Corneal oedema	15	15
2. Uveitis	08	08
3. P.C. rent	07	07
4. Iris damage	02	02
5. Collapsed A.C	01	01
6. Zonular dehiscence	01	01
7. Ptosis & ophthalmoplegia	01	01
8. Loss of nucleus into the vitreous	01	01

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Viscoelastic Shield in Phacoemulsification: An Approach in Low Corneal Endothelial Count Patients

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ABSTRACT

Purpose: *To assess the results of phacoemulsification in low corneal endothelial count patients. (1000 cells/mm^2 or less). In this technique of phacoemulsification, 2% Hydroxypropylmethylcellulose (2% HPMC) is injected in the anterior chamber every minute during the phacoemulsification procedure to provide a shield of viscoelastic to protect the vulnerable endothelium.*

Settings: *Iladevi Cataract & IOL Research Centre, Ahmedabad, India.*

Method: *This prospective study evaluated 14 patients having low corneal endothelial count. These patients were subjected to non-contact specular microscopy in 5 different locations and patients having average corneal endothelial cell count less than or equal to 1000 cells per square mm were included in this study. Central corneal thickness was obtained by ultrasonic (U/S) pachymeter. In the postoperative period, specular microscopy (in 5 different locations) and central corneal thickness by U/S pachymeter were measured at 1 month, 3 months and 1 year.*

Result: *Average corneal endothelial cell count at the end of 1 year was 755 cells/mm^2 (range 705-938) with 13.71% of endothelial cell loss as compared to average preoperative corneal endothelial cell count of 875 cells/mm^2.*

Conclusion: *Providing a viscoelastic shield during phacoemulsification is beneficial in patients with low corneal endothelial count.*

INTRODUCTION

In recent years, there have been significant improvements in phacoemulsification surgery. Still, even with such advancement there are always chances for the corneal endothelial damage during phacoemulsification surgery. The factors responsible for the corneal damage are mechanical trauma to the endothelium (by the instruments, during IOL implantation and lens fragments touching the endothelium), hardness of the cataract and size of the nucleus, turbulence of the irrigating solution, ultrasound (U/S) energy, small pupil, air bubbles and older age of the patients[1-3]. Healthy corneal endothelium may be able to withstand these traumas but a sick corneal endothelium may not. Healon^R and Viscoat^R have a beneficial effect in such conditions[4]. But their cost and unavailability at times, deprive the patient from their beneficial effects.

Considering this, we modified our surgical technique by injecting 2% hydroxymethylcellulose (HPMC) every minute in the eye during phacoemulsification process and thus carrying out phacoemulsification in a chamber filled with viscoelastic substance at all times.

PATIENTS AND METHODS

14 patients with low corneal endothelial cell count undergoing phacoemulsification surgery were included in this study from July '95 to Sept.'96. All surgeries were performed by one surgeon (A.R.V.) on Alcon 20,000 Series Legacy.

After detailed ocular examination, corneal endothelium was further evaluated by non-contact specular microscope (Non. Con Robo CA) in 5 different locations and the average of cell density (CD), coefficient of variation (CV) and percentage of hexagonality (6A) were obtained. Central corneal thickness was determined by U/S pachymeter.

Patients with ocular pathology were excluded, like the patients having glaucoma, uveitis, pseudoexfoliation, healed corneal ulcers, traumatic and subluxated cataract, eyes with congenital and hereditary ocular disorders, systemic disorders with ocular manifestations, like collagen disorders, and physically disabled patients. First 14 patients fulfilling the above criteria were enrolled in this study.

All cases were done under peribulbar anaesthesia. Scleral tunnel was made on the superior or temporal

site, depending on the type of astigmatism (against-the-rule or with-the-rule) or deep-seated nature of eyes. Rhexis was done under 2% HPMC. 30° Phaco tip or Kelman phaco tip was used, depending on the hardness of the cataract. During the phacoemulsification procedure, a circulating nurse kept on informing the surgeon every minute and 2% HPMC was injected in the eye. Stop, chop, chop and stuff technique was used for phacoemulsification procedure[5]. Care was taken to carry out phacoemulsification in the capsular bag. After the cortical removal, incision was extended, 2% HPMC was injected in the anterior chamber and an all PMMA IOL (Alcon Slimplant, LX10BD) was implanted in the capsular bag. 2% HPMC was aspirated from the anterior chamber after implantation. Intracameral vancomycin (1 mg in 0.1 ml) was injected in the capsular bag[6] and was further diluted by injecting BSS in the anterior chamber. Flow rate was 18 cc/min throughout the procedure.

Every detail of the surgical procedure was noted with special emphasis on phaco power, phaco energy and phaco time, uveal trauma during surgery, subjective grading of the cataract during surgery (by the surgeon) and total BSS used.

In the postoperative period, along with detailed ocular examination, specular microscopic examination and corneal pachymetry were carried out in 1 month, 3 months and after 1 year.

RESULTS

14 patients were included in the study (10 females and 4 males) with an average age of 70 years (range 62 to 78 years). Hardness of the cataract was graded from 1-5. 6 patients had grade-3, 4 patients had grade-4 and 4 patients had grade-5 cataract.

There was increase in the phaco time, increased consumption in U/S energy and more use of BSS in harder cataracts. This is shown in Table 1.

Table 1: Phaco variables in dense cataracts.

Density of cataract	Phaco time	CDE*	Fluid used (18 cc/min.)
Grade-III	3.08 min.	0.86	233.33 ml
Grade-IV	4.52 min.	1.78	318.75 ml
Grade-V	6.17 min.	2.93	400.00 ml

* CDE = Cumulated delivered energy

Table 2 shows that the average corneal endothelial cell count at the end of one year was 755/mm^2 with 13.71% cell loss, as compared to the average preoperative corneal endothelial cell count (875/mm^2).

Table 2: Average endothelial cell counts.

	Preop	1 month	3 months	1 year
CD(cells/mm^2)	875 (770-1043)	801 (745-834)	786 (705-938)	755 (705-938)
CV (%)	34.16	36.65	37.16	51
6A (%)	56.66	54.60	55.55	37

CD = Cell Density CV = Coefficient of variation.
6A = Hexagonality of cells.

Table 3 shows that the corneal thickness became stable at the end of 3 months (postoperative).

Corneal status in the postoperative period: 3 patients had corneal edema with cleared in 2 weeks.

Table 3: Corneal thickness.

Period	Corneal thickness (u)
Preop	529.29
1 Month	565.71
3 Months	540.86
1 Year	540.22

DISCUSSION

Previous studies have suggested the frequent use of Viscoat[7,11] in such conditions. Considering the cost and availability of the viscoelastic substances, we modified our surgical technique by using 2% HPMC (Viscomet)^R, which is not only easily available at all centres and subcentres but is also affordable. Repeatedly injecting 2% HPMC (Viscomet)^R in the eye not only coats the corneal endothelium throughout the procedure but also provides enough space to carry out manipulations in the anterior chamber.

Stop, chop, chop and stuff technique[5] was used, so that less energy is consumed during surgery[9,10]. Extreme care was taken to carry out phacoemulsification in the capsular bag[8] and thus, directing the phaco probe away from the endothelium and also keeping the lens fragments at a deeper plane.

Aspiration flow rate was kept minimal (18 cc/minute) to further reduce the stress on the corneal endothelium.

To conclude, injecting 2% hydroxypropylmethyl-cellulose into the A.C every minute during phacoemulsification provides an effective shield to the endothelium and is a very helpful and useful approach in patients with low corneal endothelial cell counts.

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Case Report

Eyelid Neurofibroma

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ABSTRACT

An 11-year-old girl with left upper lid neurofibromatosis underwent debulking surgery in two stages. An acceptable cosmetic appearance was achieved.

INTRODUCTION

Neurofibromatosis is a congenital, hereditary disorder resulting from dysplasia of neuroectodermal and mesodermal tissues. It is characterized by developmental anomalies and tumours of the nervous system, skeleton, viscera and pigmentary lesions of skin[1]. Halepota and Shaikh[2] have earlier reported 2 cases of orbital and eyelid neurofibromatosis. Two patients (Fig. 1 & 2) with cafe-au-lait spots and histologically proven lid neurofibroma were operated upon to achieve better cosmetic appearance. Unfortunately, one patient was lost to postoperative follow-up.

TECHNIQUE

A young girl (Fig. 2) with left upper lid neurofibroma was operated upon on 30.10.96. Approximately lateral one-third of the lid was excised. The skin over the lateral canthal region was undermined to expose lateral canthal raphe. The lateral part of the remaining tarsal plate was approximated to the lateral canthal raphe by 3 nonabsorbable 4/0 Nylon sutures.

The levator muscle shortening was done through the skin approach. 18 mm of the muscle was excised along with excessive neurofibromatous tissue. The surgical procedure was hallmarked by excessive haemorrhage controlled by wet-field cautery.

Postoperative undesirable thickening of the lateral part of the lid margin was noted (Fig. 3). One month later, the patient underwent lamellar division with splitting of the lid margin at the gray line upto the fornix in the lateral half of the lid. Posterior lamellar marginal tissue was excised along with some excision of the skin of the anterior lamella. The anterior and the posterior lamellae were sutured with 6/0 vicryl.

The final postoperative picture (Fig-4) showed adequate palpebral aperture with acceptable cosmetic appearance. VA right eyes was 6/6, VA left eye was 6/9, improved to 6/6 with -1.0 D Sph. Ocular motility and fundi were normal.

DISCUSSION

Two patients with lid neurofibroma were encountered in the Nawabshah region, in the central part of Sindh province. The two patients came from two different localities and no relationship existed between them.

In our previously reported cases results of debulking surgery were poor and unsatisfactory[2]. This is in accordance with reports in the literature[3,4]. In this patient with lid neurofibromatosis alone the results achieved, though not perfect, were fairly reasonable and acceptable from cosmetic point of view.

Pathologist's report of the excised lid tissue was:

Stratified squamous cell epithelium with subjacent tissue, consisting of bundles of nerve fibres crossing each other at various places. They contain elongated, wavy nuclei which are uniform and regular.

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Figure - 1:
A young girl with neurofibroma of left upper lid and marked ptosis.

Figure - 3:
Patient in Fig-2, after debulking procedure along with levator resection. Note undesirable thickening of lateral part of eyelid.

Figure - 2:
An 11-year-old girl with neurofibroma of left upper lid

Figure - 4:
Same patient as in figs-2 & 3, after excision of excess posterior lamellar tarsal tissue and of skin of anterior lamella

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Ophthalmic "Pastpourri"

The First Ever Printed Book on Ophthalmology

The first ophthalmic book ever printed is considered to be "De Oculis" (Eorumque Egritudinibus Et Curis). It was written by Benevenutus Grassus of Jerusalem. The first Latin edition was published in Ferrara in 1474 A.D. Casey E. Wood provided the first English translation in 1929, published by the Stanford University Press, Stanford, California.

Grassus was the most famous non-Muslim Oculist (perhaps a baptized Jew) of medieval times. He was born in the twelfth century and lived for a time in Jerusalem. He traveled considerably in Italy and Languedoc; he lived probably in Salerno and in Montpelier.

According to Grassus there are seven varieties of cataract of which four are curable and three incurable. The first of the curable varieties is white, like purified lime. The second is also white, proceeds from the stomach and is caused by bad food from which arises an evil vapor that ascends to the brain and so gives rise to cataract. The third species is white with a bluish tinge and is caused by great pain in the head, such as is caused by migraine; sometimes also by excessive cold and privation, shedding of tears and wakefulness. The fourth species is of a lemon tint and is due to excessive eating and drinking. It is often generated from a melancholy humor.

Regarding the treatment of cataract, Grassus begins by stating emphatically that no variety of cataract can be cured until, as we say nowadays, it is "ripe". The method of determing the ripeness of a cataract is not derived from its appearance but from the fact that the patient is absolutely blind. This condition, he says, "is not to be cured, as some ignorant physicians believe, by purgatives or powders or collyria or electuaries because the trouble lies within the coats of the eye".

Only recently, after seven hundred years, has this concept of surgery dependent on "maturity or ripeness" of cataract given way to surgery on demand at an early stage when vision is compromised enough to be an annoying handicap. Seems like all of us, the patients as well as the surgeons, are in a hurry, in contrast to the more laid back attitudes of the olden days.

Excerpted from "A Review of the First Book on the Diseases of the Eye, By Benevenutus Grassus, 1474". By Henry FP. Medical Library and Historical Journal, Vol III, 1905, pp27-40. Read before the Johns Hopkins Historical club at Baltimore, MD, December 12, 1904.

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Comparison of Cases of Myopia with and Without Retinal Detachment: Preliminary Results from an Ongoing Study

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ABSTRACT

A comparative study of 24 patients with retinal detachment and 24 patients without retinal detachment matched by age, sex and refractive error, was made. The patients had moderate (3-6D) to high (7D and above) myopia. The eye examination included autorefraction, keratometry and A-scan biometry, besides the dilated pupil funduscopy.

The refractive error in the right eyes was -3D to -29.5D, and -2D to -18.25D in the left eyes. Mean axial length for all subjects was 28.61±2.16mm, and the mean vitreous body length was 21.18±2.30mm. The mean age of onset of myopia was 13.21±7.50 years. No significant difference was found between retinal detachment and non retinal detachment cases regarding the age of onset of myopia, their gender or occupation. Similarly, no significant difference was found in the two groups regarding their socioeconomic status, such as personal income, family income or parents' income.

INTRODUCTION

Myopia is the commonest cause of impaired vision and is recognised as a distinct visual disability. Studies relating to myopia started as early as the beginning of the nineteenth century and a number of demographic and correlation studies were carried out to establish certain factors responsible for the disease. It has been reported that certain races have higher prevalence of myopia as compared to others[1-5], e.g. the Chinese, the Koreans, and the Japanese have 70% prevalence, whereas in the native Americans, Indians and Blacks it is 25%, 16.6% and 12.6%, respectively (Rasmussen, 1936). However, the causes of myopia remain unclear, although environmental and genetic factors may play important roles in the pathogenesis of myopia[6]. Furthermore, no satisfactory concensus has been reached in respect to the pathogenesis, epidemiology, prevention and treatment of myopia.

Early onset of myopia is generally characterised by refractive anomalies with pathological findings in a small percentage of cases[7-8]. The myopic eyes show higher refractive errors associated with axial elongation and a variety of fundus changes other than retinal detachment (Bruckner & Franceschetti, 1931). It has been reported that retinal detachment occurred in high grades of myopia with earlier onset (Kaufmann 1969). There may be a relationship between the degree of myopia, age, and onset of retinal detachment. The incidence of peripheral degeneration becomes higher with higher degrees of myopia. The progression of myopia is associated with an increase in the axial length of the eye[9]. It has been observed that most high myopes had their first pair of glasses before 13 years of age and particularly before 10 years. Therefore, high myopia was suggested to be an early onset myopia.

There are many contradictory studies about the prevalence of myopia related to sex[10]. Prevalence of myopia among girls was significantly more than boys[11]. Higher prevalence of myopia among females ($P < 0.05$) was also supported by Sperduto and co-workers (1970) and by Angel and Wissman (1980). In nontraumatic retinal detachments also, there was a small sex-related difference, with higher incidence in females. In myopic males the risk of detachment increased with the degree of myopia and with age (Tornquist, 1987). A study by Laatikainen and Tolppanen (1985) showed that 50.9% of females developed retinal detachment with myopia. In cases of retinal detachments with macular holes, most patients were females.

It is difficult to say whether myopia develops as a result of extensive ocular use or due to normal axial growth[10]. Refraction is relatively stable after the third decade and shows gradual reduction into mid-adult life, but is implicable for nonpathologic myopia (Sorsby,

1960; Blegvad, 1927). Strenuous close work may mimic to produce myopia (Jancke and Holste, 1940). Those who are less educated and who use their eyes sparingly for close work, as farmers and seamen, have lower incidence of myopia[12]. Mucelerich and co-workers (1953) found 24% prevalence of myopia in near-work-related occupations, compared with 14% among others. Frequency of myopia increased with the amount of time spent in the near work occupation[10]. Diamond (1957 and 1965) has been convinced about the adult onset of myopia in aviators and in submarine crews. Opinion given by van Curia (1870) suggests that it might be of lenticular origin and Lindner (1949) suggested that it might be because of greater axial length. There is a thought that myopia increases as the level of education rises[12]. Data suggest that peripheral retinal degeneration is the commonest cause of retinal detachment and that lattice degeneration alone has higher prevalence rate of axial length over 26 mm in young adults[13].

Ware (1813) reported predominance of myopia among city dwellers. Other studies have found myopia more frequently in rural populations. No correlation was established between the incidence of myopia and parental income or education levels in the results of two US health surveys (Roberts & Slaby, 1974; Roberts & Rowland, 1978), but the HANES survey found frequency of myopia as 17.2% in those with annual family income above $1,000. A 1974 study also showed that 16.8% of myopia occurred with family income above $5,000 and 35.1% for incomes more than $15,000. Increased percentage is frequently seen in the group with financial success[14]

The prevalence of retinal detachment in myopic eyes related to the prevalence of the disease precursors in such eyes (Bonnet, 1993). Lemrini et al (1993) reported that retinal detachment due to myopia was 71.4% in children. An eye with refractive error of -1 to -3 D had a four-fold increased risk of retinal detachment compared with a nonmyopic eye. Moreover, if the refractive error is greater than -3 D the detachment risk increases by ten-fold. Kaufman (1969) observed that there is a possible relationship between retinal detachment and earlier onset of myopia. The data by The Eye Disease Case-Control Study Group (US) in 1993 suggest that about 55% of nontraumatic detachments in eyes without previous surgery are attributable to myopia. The incidence of retinal detachment was 97.6% in myopia over -8.25 D, 67.7% in myopia between -8.0 and -3.25 D, and 1.1% in eyes under -3.0 D (Morita et al, 1991). Congenital myopia may be a contributing factor in developing nontraumatic retinal detachment (Monin et al, 1989). Myopic eyes had equatorial breaks 38% of the time, versus 19% for nonmyopic eyes (Malbran et al, 1989). Ogawa & Tanaka (1988) described that relative frequency increased with an increased severity in myopia higher than -15.0 D, where the frequency was 68.6 times higher than for the hyperopic range and the incidence was 82.16%. Studies suggested that axial length, in addition to myopic pathology, is a factor associated with retinal detachment and 45% were found to have axial lengths more than 1 mm longer than would be expected from the eye's refraction[9]. The incidence of retinal detachment in eyes with axial length greater than 25.0 mm was found to be 9.59%, while no detachments occurred in eyes less than 25.0 mm in length[13]. Myopia greater than or equal to -1.0 D with retinal detachment was found in 50.6% of the phakic eyes (Laatikainen & Tolppanen, 1985). It was observed by Schwickerath and Edmond (1984) that emmetropic eyes with retinal detachment showed a slightly greater axial length than the control eyes, the eyes with moderate myopia and retinal detachment showed a significantly greater axial length than the control eyes, and again the eyes with high myopia and retinal detachment were found to have axial lengths greater than those of the control eyes. Extensive expansion of the ora / equatorial region occurred with increased axial diameters and caused different fundal changes, including retinal detachment (Curtin, 1985). A large number of authors have noted disproportionately high frequency (35-79%) of myopic refraction among detachment population.

PATIENTS AND METHODS

a. General Overview:

This is a comparative study in which 24 subjects with retinal detachment (RD) were compared with 24 matched subjects who did not have retinal detachment (NRD).

b. RD sample

This was a study conducted in the outpatient department. Patients selected had moderate (3-6 D) to high (7 D and above) myopia. Retinal detachment (except diabetic and traumatic) subjects were invited to participate in the study. After completing all the formalities in OPD, the patient was given a consent form and a questionnaire (translated into Chinese) which was filled by the subject himself/herself. The questionnaire had been divided into a) personal information and b) family history. If the subject gave consent, he/she was informed about the drugs, such as Amethocaine or Proparacaine Hydrochloride 0.5% for surface anaesthesia of the

cornea. Cyclopentolate for younger subjects or Tropicamide 0.5-1% for older and presbyopic subjects for dilatation of pupil, and was examined after twenty minutes. He/she was also advised not to travel in dusty environment for some time and about inability to read for two to three hours after examination, while retaining ability to see distant objects. They were also advised that it was not an operative procedure but merely a simple eye examination without any pain or discomfort. All were informed about the toxicity of the drugs that were used.

C. NRD Sample

The subjects selected were similar to those of RD sample regarding the age, sex, refractive error and age of onset. The procedure was the same as for RD subjects.

Exclusion criteria:

1. Children under 12 years
2. Non cooperative patients
3. Amblyopia
4. Preexisting glaucoma
5. Phthisical eye
6. corneal scar
7. Sensitivity to drugs to be used.
8. Previous ophthalmic surgery
9. Impaired vision uncorrectable by refraction.

D. Procedure undertaken:

Eye examination:

- Autorefraction
- Keratometry
- A-scan biometry

a. Autokerato-refraction: KR-7100 autokerato-refractometer was used. Visual acuity was recorded. Refraction with cycloplegia and corrected visual acuity were measured by an autokerato-refractometer three times, so that maximum plus value and minimum minus value could be avoided with the effect of accommodation.

b. Keratometry: The keratometry of both eyes was performed with autokerato-refractometer (KR-7100) in the same sitting.

c. A-scan biometry: Axial length, anterior chamber depth, lens thickness and vitreous body length were determined by A-scan ultrasound biometer with a 7.0 MHz focused transducer with a soft probe which had a central fixation light (Teknar model A/P III) after surface anaesthesia. Five readings were taken in each eye and the mean value recorded, provided the probe compression was within normal limits.

Data analysis

All data collected were entered into a computer data base for appropriate analysis.

RESULTS

The preliminary study showed that the distribution of refraction in the right eyes was -3D to -29.5D (Mean±SD of the refraction was -10.63±6.52) and -2D to -18.25 SD (Mean±SD of the refraction was -9.53 ± 3.80) in the left eyes.

For all the subjects the respective mean axial length was 28.61±2.16 mm. Range values were 25.37 -34.07 mm. For those subjects with RD, there was an association between the axial length and the degree of myopia where $r = -0.7032$ & $P < 0.001$.

The vitreous body length and respective mean values were 21.18±2.30 mm. Range values were 17.55 -26.20 mm. For those subjects with RD, there was an association between the vitreous body length and the degree of myopia where $r = -0.6527$ & $P = 0.001$.

For all the subjects the mean±SD for age of onset of myopia was 13.21±750 yr. Range values were 4 to 40 yr. The relationship between RD and NRD patients in respect to the age of onset of myopia was analysed. No significant difference was found. There was also no significant difference between RD and NRD cases in respect to gender (Chi-square test: $P = 0.319$).

There was no correlation of occupation amongst the patients (Chi-Squire test: $P = 0.355$).

Regarding socioeconomic status, such as monthly personal income ($P = 0.113$) or family income ($P = 0.080$) or parent's income ($P = 0.448$), the analysis showed nothing of significance.

DISCUSSION

There was a relationship between the degree of myopia, axial length vitreous body length and the type of retinal detachment. Incidence of peripheral degeneration was higher with higher degree of myopia, reaching 15 to 20% in myopia of -10 D. Influence of age of onset of myopia, occupation or socioeconomic status to the retinal detachment was unclear. In cases of retinal detachment with macular hole, most patients were females. But in the case of peripheral breaks, retinal detachment was a little more common in males. Since ours are the preliminary results of an ongoing

study, confirmation of data would have to await the completion of the study. Further exploration and data analysis are needed.

ACKNOWLEDGEMENTS

I have to express my deepest gratitude and sincere appreciation to the department of Ophthalmology & Visual Sciences, the Chinese University of Hong Kong, Li Ka Shing Eye Specialist Clinic and the Li Ping Medical Library of Prince of Wales Hospital, for allowing me to conduct the study and for providing all sorts of help for my work. I am also deeply grateful to Mr. Albert Cheung of CCTER, PWH for his kind help.

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Lens Thickness In Different Types of Senile Cataract

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Dow Medical College and Jinnah Postgraduate Medical Centre, Karachi.

ABSTRACT

A joint study was conducted at Dow Medical College and Jinnah Postgraduate Medical Centre, Karachi, to find out the relationship of lens thickness (anteroposterior diameter) with age, in different types of senile cataracts in 51 patients between 50 and 78 years of age.

We found 19.5% cortical, 33.3% nuclear, 35.3% combined cortical and nuclear, and 11.8% posterior subcapsular cataracts. Histologically, the degenerative changes were, swollen cells, tiny globules, calcification, sclerosis, epithelial cell migration beneath posterior capsule and villous projections in posterior capsule. The anteroposterior thickness was significantly reduced in cortical and posterior subcapsular cataracts as compared to others. This was in contrast to normal (clear) lens thickness which showed a linear relationship of lens thickness with age. The morphological changes of lens did not show any relation with sex and profession of the patient.

INTRODUCTION

Senile cataract is an important cause of blindness in older subjects (Fig.1). This is an idiopathic phenomenon which generally occurs in persons above 50 years of age and can be explained by fluctuation in the orientational order of proteins and is related to age[1]. The anteroposterior dimension increases from 3.5-4.0 mm by birth to 4.75-5.0 mm at 95 years of age, resulting from the newly formed fibers under the capsule displacing the previously formed fibers centrally.

The present study was designed to measure the lens thickness and to relate it with morphology of the cataractous lens (observed by slit-lamp). Moreover, we also examined the cataractous lenses histologically[2,3].

PATIENTS AND METHODS

Out of 400 cases of cataracts admitted and treated in the Eye Department, Jinnah Postgraduate Medical Centre, Karachi, from August 1991 to July 1994, we selected 51 cases of senile cataracts for our study. These 51 cases did not have any history of trauma, glaucoma or steroid therapy. These patients were subjected to clinical examination, including slit-lamp examination, distant direct ophthalmoscopy, funduscopy with indirect ophthalmoscope to find out morphological pattern of cataract as classified by Perkins[4]. We took slit-image photographs and performed Auto-A scan (sonogram) to find the lens thickness (Fig. 2). Normal subjects of the same age group were similarly examined and investigated as controls. The extracted lenses of these patients were processed to obtain 3μ-thick stained sections for histological relationship.

To compare the means of cataractous and control groups "the student "t" test" was applied[5].

RESULTS

51 cases in our study were between 50 - 78 years of age. Sex distribution (male : female) was 3.25: 1. Their professional distribution showed 12 farmers, 9 housewives, 8 drivers, 6 industrial workers, 4 teachers, 4 shopkeepers, 4 mechanics, 2 clerks and the remaining 2 were chowkidars (watchmen).

On distant direct ophthalmoscopy red fundal glow was obscured with lenticular opacity in most of the cases. Slit-lamp examination revealed 10 cortical cataracts. Their mean thickness of 3.54 ± 0.11 mm by ultrasonogram (Fig. 3 and 4) in patients aged between 60-65 years was significantly reduced ($P < 0.001$) when compared with 8 controls of similar age group. 17 cases of nuclear cataracts (Fig.5) with mean thickness of 4.17 ± 0.15 mm, (age range between 58-76 years), were of about similar thickness when compared with 10 controls of similar ages. 18 patients had combined cortico-nuclear cataracts (Fig.6) with mean thickness of 4.07 ± 0.010 mm, (age range between 56-74 years), that was insignificantly lower when compared with 10 controls of similar ages. However, the 6 with posterior subcapsular cataracts (Fig. 7) showed mean thickness of 3.75 ± 0.07 (age range between 62-72 years) which was significantly reduced ($P < 0.001$) compared with 5 controls of similar ages (Table-1).

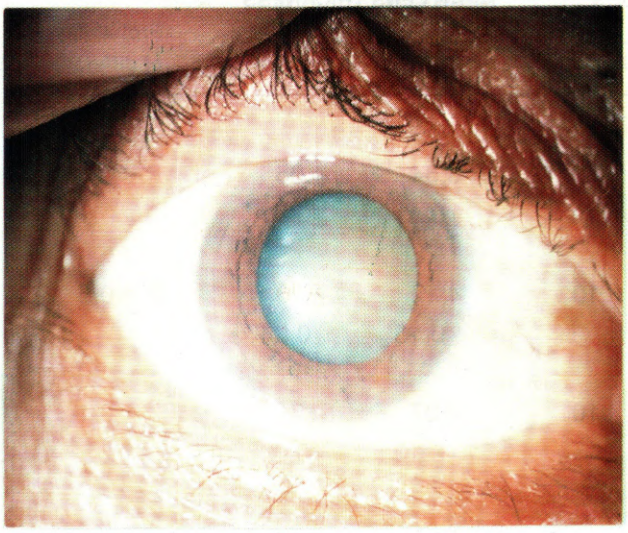

Figure - 1:
Photograph of senile mature cataract showing almost complete opacity of the lens in a 65-year-old man.

Figure - 3:
Photograph (slit-image) of cortical senile cataract showing opacity of anterior cortex (arrow) in a 56-year-old man.

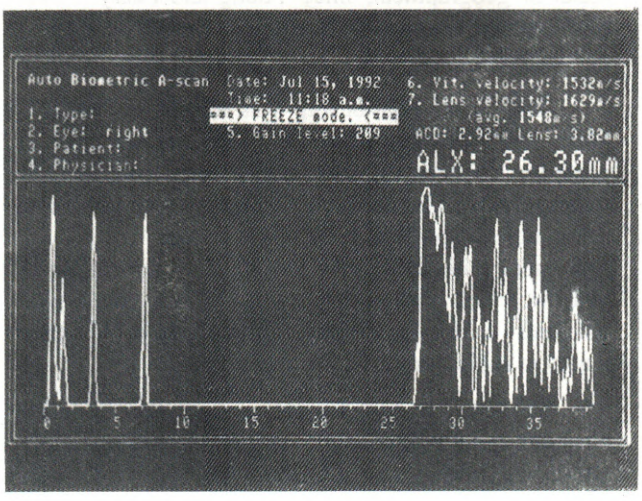

Figure - 2:
Normal axial echogram of the human eye. On the left, the transmitter pulse, as well as echoes from both surfaces of the lens at about 4 and 8 mm. On the right, scleral echoes near 26mm (mm scale at base). The anterior chamber, lens and vitreous are acoustically homogeneous. (50-year-old man).

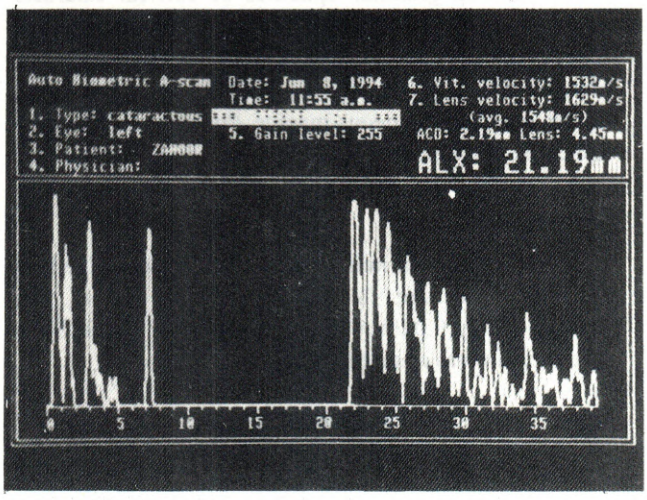

Figure - 4:
Axial echogram of cataractous eye showing abnormal echoes in the lens area which is acoustically nonhomogeneous.

Table-1: Comparison of mean lens thickness (ultrasonic method) in mm, of different types of senile cataracts with that of clear lenses of matching ages.

Cataract types vs normals	Age (Yrs)	NUMBER OF CASES		MEAN LENS THICKNESS		Probability of difference
		Cataracts	Normal	Cataract	Normal	
Cortical vs clear lenses	50-65	10	8	3.54 ±0.11	4.05 ±0.04	P < 0.001
Nuclear vs clear lenses	58-76	17	10	4.17 ±0.15	4.26 ±0.04	P > 0.5
Cortical & nuclear vs clear lenses	56-74	18	10	4.07 ±0.10	4.21 ±0.04	P > 0.1
PSC and others vs clear lenses	62-72	6	5	3.75 ±0.07	4.25 ±0.02	P < 0.001

KEY: vs = Versus PSC = Posterior subcapsular

HISTOLOGICAL APPEARANCE

Slit-lamp granular opacities of cortical cataracts revealed swollen cells and Morgagnian globules in histological sections. The chalky white opacities showed calcium deposition. Nuclear cataracts were amorphous homogeneous masses. Posterior subcapsular opacities disclosed posterior epithelial cell migration and their villous projections in posterior capsules, histologically.

The linear relationship was noted between the lens thickness and age in control lenses, and it was approximately 0.02 mm to 0.025 mm every year. Such relationship was absent in cataracts (Fig. 8).

DISCUSSION

The purpose of this study was to see whether changes in lens thickness could be used as an indication of senility of cataract and if their morphology could be related with histology. Linear regression analysis of age and the lens thickness showed a highly significant relationship in subjects with clear lenses (controls); their lens thickness increased by 0.02 to 0.025 mm per year. Similar results have been reported by Perkins[4] who noted an increase of 0.02 mm per year. Brown[6] noted 0.029 mm per year. This difference might be racial or geographical, since Young and Leary[7] found the lenses of Eskimos to be slightly thicker than those of Caucasians.

This linear relationship was absent in cataracts. Mean lens thickness of cortical cataracts and that of posterior subcapsular cataracts was statistically reduced, while that in nuclear cataracts was similar to age-matched controls. Our observations are in full agreement with those of Perkins[4] who also observed that the lenses with cortical and posterior subcapsular opacities were significantly thinner than the clear lenses in subjects of the same age group.

Though the histological examination revealed clear cut and greater detail of morphology, yet the slit-lamp examination and ultrasonography provide more than sufficient clues in early detection of changes in the lens.

CONCLUSION

The anteroposterior thickness of lens normally keeps on increasing with age throughout life.

The significant reduction of lens thickness in cortical and posterior subcapsular cataract is due to

Figure - 5:
Photograph (slit-image) of nuclear senile cataract showing nuclear opacity in a 65-year-old man.

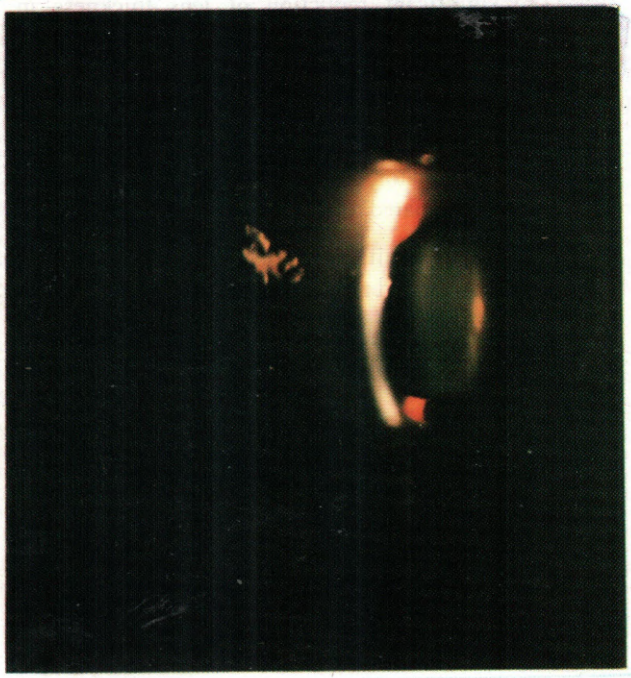

Figure - 7:
Photograph (slit-image) of posterior subcapsular senile cataract

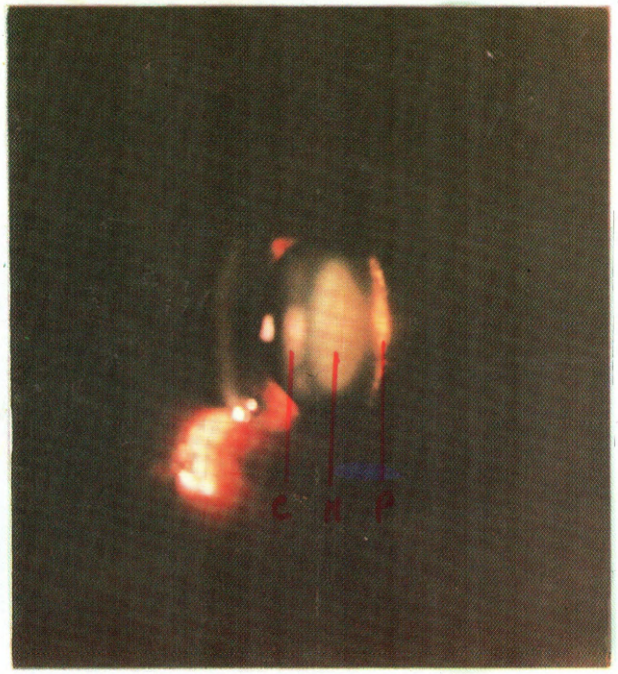

Figure - 6:
Photograph (slit-image) of senile cataract showing opacity in nucleus (N), anterior cortex (C) as well as posterior subcapsular region (P), in a 68-year-old patient.

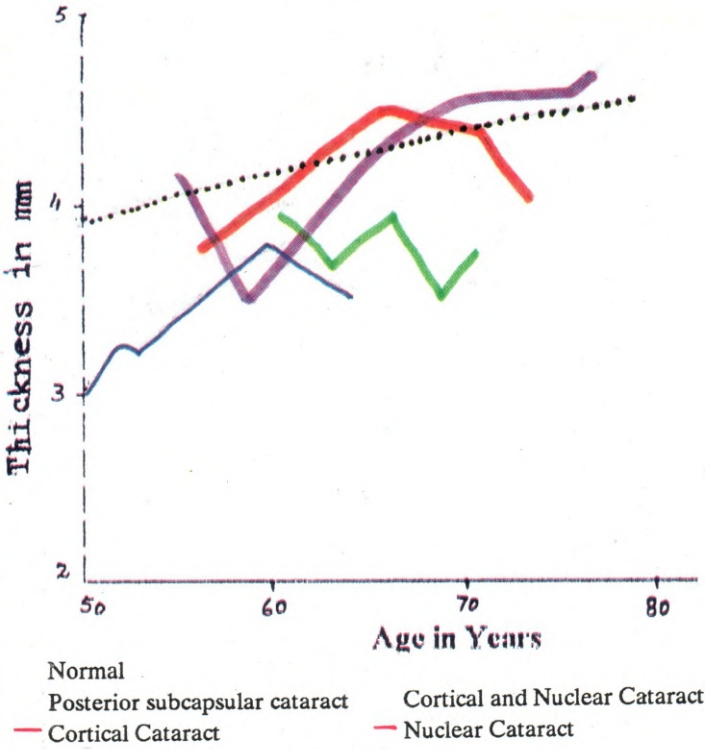

Figure - 8:
The axial thickness of lens in relation to age in normal clear lenses and different types of senile cataracts in 51 patients.

keeps on increasing with age throughout life.

The significant reduction of lens thickness in cortical and posterior subcapsular cataract is due to associated degenerative changes at the equator, resulting in less number of new lens fiber formation.

As nuclear cataracts did not show degenerative changes at the equator, there is no significant difference in thickness, compared to age-matched clear lenses.

There is insignificant reduction of thickness in combined cortical and nuclear cataracts.

These facts are helpful for an ophthalmologist to keep in mind during surgery to get better post-operative results.

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Abstracts

Edited by Ajmal Nisar

Chemoreduction in the Initial Management of Intraocular Retinoblastoma

Shields CL, De Potter P, Himelstein BP, Shields JA, Meadows AT, Maris JM. Arch Ophthalmol. 1996; 114: 1330-8

The purpose of this study was to determine whether chemoreduction could be used to decrease the size of retinoblastoma so that enucleation or external beam radiotherapy could be avoided and more conservative modalities employed.

A prospective pilot study was performed to assess the effectiveness of a 2-month chemoreduction regimen of vincristine sulfate, etoposide, and carboplatin in patients with retinoblastoma. The study included 20 patients with 54 tumors in 31 eyes.

At the initial examination, the mean tumor base was 12mm and the thickness, 7mm. Vitreous seeds were present in 14 eyes (45%). A secondary retinal detachment was present in 24 eyes (77%) and, when present, involved a mean of 71% of the retina. In 11 eyes (36%) the retina was totally detached with serous subretinal fluid. After 2 months of chemoreduction, all 54 tumors showed regression in size, and 48 (89%) showed evidence of calcification. The mean tumor base was 8mm and the thickness, 4mm. Overall, there was a mean 35% decrease in base and 49% decrease in thickness of the tumor at the end of the treatment period. A complete response was found in 25 tumors (46%) and a partial response in 29 (54%). The subretinal fluid had resolved completely in 50% of the cases (12/24 eyes), and, in the 11 eyes with total retinal detachment, the subretinal fluid had completely resolved, leaving flat retina, in 6 eyes (54%). The vitreous seeds demonstrated some degree of regression in all cases, and in 5 eyes there was 90% to 100% calcification of the seeds. Short-term systemic toxic effects were mild (transient bone marrow suppression). Enucleation was avoided in all cases; external beam radiotherapy was necessary in 9 eyes because of diffuse vitreous seeds. The remaining 22 eyes were treated with local methods after chemoreduction.

The authors concluded that tumor shrinkage with chemoreduction may allow treatment with less invasive measures, such as cryotherapy, laser photocoagulation, thermotherapy, or plaque radiotherapy, thereby avoiding enucleation and external beam radiotherapy.

Macular Scatter (`Grid') Laser Treatment of Poorly Demarcated Subfoveal Choroidal Neovascularization in Age-Related Macular Degeneration. Results of a Randomized Pilot Trial.

Bressler NM, Maguire MG, Murphy PL, Alexander J, Margherio R, Schachat AP, Fine SL, Stevens TS, Bressler SB Arch Ophthalmol. 1996; 114: 1456-64

The purpose of this study was to determine the effects of macular scatter ("grid") laser photocoagulation compared with observation on the visual function of eyes with subfoveal choroidal neovascularization (CNV) that has poorly demarcated boundaries and to provide preliminary data for the evaluation of the feasibility and design of a larger, definitive trial.

Symptomatic individuals with subfoveal CNV secondary to age-related macular degeneration in whom fluorescein angiography showed occult CNV with poorly demarcated boundaries; classic CNV was allowed but did not need to be present for entry into the study.

Fifty-two eyes were assigned to observation. Fifty-one eyes were assigned randomly to treatment consisting of macular scatter ("grid") laser photocoagulation to the area of CNV. The treatment protocol for 8 of these eyes also included confluent laser photocoagulation to areas of classic CNV. The average visual acuity decrease from baseline was greater in the treated than in the observed group. The difference between these groups was greatest within the first year after study enrollment. At 24 months, slightly more than 40% of the eyes in each group had lost 6 or more lines of visual acuity. Similar results were noted for the subgroup of eyes initially with angiographic features of occult CNV but no classic CNV.

These short-term study results suggest that macular scatter ("grid") laser treatment is not beneficial and is possibly harmful compared with observation for symptomatic subfoveal CNV with poorly demarcated boundaries in age-related macular degeneration. With or without treatment, a significant proportion of these patients are at risk of severe visual loss within 2 years

of seeking treatment, even when the eye initially has occult CNV and no classic CNV.

Retinal Complications After Aqueous Shunt Surgical Procedures for Glaucoma

Law SK, Kalenak JW, Connor TB Jr. Pulido JS, Han DP, Mieler WF.
Arch Ophthalmol 1996; 114: 1473-80.

The purpose of this study was to assess retinal complications and to identify risk factors for retinal complications following aqueous shunt procedures.

Records of 38 consecutive aqueous shunt procedures that were performed on 36 patients at the eye Institute of the Medical College of Wisconsin, Milwaukee, from June 1993 to March 1995 (minimum follow-up, 6 months) were reviewed. The mean + SD follow-up was 11.4+5.2 months (median, 10.5 months).

Twelve patients (32%) had the following retinal complications: 4 serous choroidal effusions (10%) that required drainage, 3 suprachoroidal hemorrhages (8%), 2 vitreous hemorrhages (5%), I rhegmatogenous retinal detachment (3%), I endophthalmitis (3%), and I scleral buckling extrusion (3%). Surgical producers for retinal complications were required in 8 (67%) of these 12 patients. Visual acuity decreased 2 lines or more in 9 (75%) of these 12 patients. The median onset of a postoperative retinal complication was 12.5 days, with 10 patients (83%) experiencing complications within 35 days. Serous choroidal effusions developed in 10 other patients (26%), and these effusions resolved spontaneously. Visual acuity decreased 2 lines or more in 2 (20%) of these additional 10 patients. Patients who experienced serious retinal complications were significantly older, had a higher rate of hypertension, and postoperative ocular hypotony. Serious retinal complications were distributed evenly among patients with krupin valves with discs and Molteno and Baerveldt devices. Experience with the Ahmed glaucoma valve implant was limited.

In Conclusion, aqueous shunt procedures may be associated with significant retinal complications and subsequent visual loss.

Excimer Laser Effects on Human Corneal Endothelium Modulation by Serum Factor (s)

Lambert RW, Anderson JA, Heitzmann J, Sutherland CJ, Moore MM, Binder PS
Arch Ophthalmol 1996; 114: 1499-505

The purpose of this study was to determine the possibility of endothelial cell damage after excimer laser ablation.

Endothelial cell densities and morphology of human corneas after photoablations or mechanical keratectomy were compared with those of the untreated mates after 1 week of culture with or without serum.

Corneas cultured in serum-free medium after ablation to a depth of 150 um showed endothelial cell densities reduced to 60% of untreated, mate corneas; ultrastructural analysis showed endothelial cell damage not seen in untreated mates. Corneas ablated to the same depth and cultured in serum-entriched medium showed no endothelial cell density loss, nor did corneas cultured in serum-free medium after an ablation to a depth of 50 um or mechanical keratectomies averaging 95 um.

The authors concluded that endothelial cell loss in deep laser resections may be prevented by factor (s) in fetal bovine serum. The apparent lack of cell loss in clinical studies may be related to the protective action of similar factors in aqueous humor.

Smoking and Age-Related Maculopathy The Blue Mountains Eye Study

Smith W, Mitchell P, Leeder SR.
Arch Ophthalmol 1996; 114: 1518-23

The purpose of this study was to assess the associations between stage of age-related maculopathy (ARM) and current, past, and passive smoking.

A cross-sectional study of 3654 subjects from a defined geographic area west of Sydney, Australia, identified subjects with late age-related macular degeneration (AMD) and early ARM by ocular examination and detailed grading of retinal photographs. Interviewer-administered questionnaires provided data about smoking history for subjects and spouses. Logistic regression, adjusting for age and sex, and 2-way analysis of variance were used to assess associations.

Current tobacco smoking was significantly associated with late AMD (odds ratio [OR], 3.92), including neovascular AMD (OR, 3.20) and geographic atrophy (OR.4.54), and early ARM (OR, 1.75). Having ever smoked was significantly associated with late AMD (OR, 1.83) but not early ARM. Passive smoking was associated with increased but insignificant odds for late AMD. The risk was slightly higher among women compared with men for most exposure categories.

The authors concluded that these findings provide convincing evidence that smoking may be causally associated with ARM. The strongest risk was found for

current smokers, suggesting potential benefits of targeting education to older people who are current smokers and have signs of early ARM.

Occult Macular Dystrophy

Miyake Y, Horiguchi M, Tomita N et al, Kondo M, Tanikawa A, Takahashi H, Suzuki S, Terasaki H.

Am J Ophthalmol 1996; 122: 644-53.

Occult macular dystrophy is a hereditary macular dystrophy without any visible abnormality of the fundus or abnormality indicated by fluorescein angiography even when visual acuity is decreased. Normal full-field electroretinogram in both cone and rod components with abnormal focal macular cone electroretinogram is the key to diagnosing this disorder. The purpose of this study was to identify the function of the macular rods and to provide detailed clinical findings in occult macular dystrophy.

Thirteen patients from eight families were examined. The fundi of 12 patients were essentially normal (occult macular dystrophy), and the oldest patient in one family disclosed bull's eye maculopathy. In the 12 patients, including the patient with bull's eye maculopathy, the profiles of cone and rod absolute thresholds were performed across the 60-degree horizontal meridian of the posterior pole.

All 12 patients, showed cone sensitivity loss only in the macular area. Six relatively young patients revealed normal rod sensitivity, whereas six older patients showed borderline rod sensitivity or abnormal rod sensitivity in the macular area.

In conclusion, the pathology of occult dystrophy involves either only the macular cone system or macular cone and rod systems without any visible abnormality. This difference of the pathology suggests a different clinical entity or a different stage of occult macular dystrophy.

Comparison of Suture-in and Suture-out Postkeratoplasty Astigmatism With Single Running Suture or Combined Running and Interrupted Sutures

Filatov V, Alexandrakis G. Talamo JH, Steinert Rf.

Am J Ophthalmol 1996; 122: 696-700.

The purpose of this study was to evaluate postkeratoplasty astigmatism between two suture techniques 2 to 4 years postoperatively in a group of patients previously studied 9 months postoperatively.

Thirty-two patients who underwent penetrating keratoplasty were randomly assigned to one of two groups. Group 1 (16 patients) had a 24-bite single running 10-0 nylon suture with postoperative suture tension adjustment; group 2 (16 patients) had combined 16-bite running and eight interrupted 10-0 nylon sutures with selective postoperative removal of interrupted sutures. During long-term follow-up the running suture was removed in 19 patients (59%).

Postoperative astigmatism was slightly lower in patients with the single running suture technique when sutures were in place and was slightly greater after the sutures were removed compared with the combined running and interrupted suture technique (sutures in: single running suture + SD, 2.6 + 1.2 diopters [five patients, 31%]; combined running and interrupted sutures, 3.8 + 1.1 diopters [eight patients, 50%]); sutures out: single running suture, 3.3 + 1.3 diopters [11 patients, 69%]; combined running and interrupted sutures, 2.8 + 1.5 diopters [eight patients, 50%]). These differences were not statistically significant (sutures in, P<.13; sutures out, P <.46). Averages of follow-up were group 1,48.3 + 10.6 months and group 2, 46.3 + 13.0 months. Follow-up ranged from 23 to 60 months.

The authors concluded that postoperative astigmatism 4 years after penetrating keratoplasty is similar for these two suturing techniques, with or without residual sutures. A single running suture results in more rapid visual rehabilitation and less early astigmatism compared with the combined interrupted and running suture technique.

Evaluation of the Lacrimal Drainage Function by the Drop Test

Sahlin S, Chen E.

Am J Ophthalmol 1996; 122:701-8

The purpose of this study was to compare the fluorescein dye disappearance test with a new test for lacrimal drainage capacity, the drop test.

In the fluorescein dye disappearance test, I ul of fluorescein solution was instilled into the conjunctival sac of normal subjects and patients with epiphora. Fluorescence from the tear film was measured, and the rate of dye disappearance was calculated as a measure of tear drainage. It the drop test, drops of 10 ul of lukewarm saline solution were repeatedly instilled into the conjunctival sac for 3 minutes. Excessive saline solution was then removed from the tear film and measured. The volume of saline solution drained by the lacrimal passage could thus be calculated.

The fluorescein dye disappearance test showed, in normal subjects, a tear turnover rate of 10.9 + 3.1% (95% confidence interval) per minute, which was not

age dependent. The drop test showed a decreased lacrimal drainage capacity with increasing age in normal subjects, with a mean capacity of 150 + 38.5 ul/3 min for those 41 to 80 years old. In patients with indoor epiphora, the fluorescein dye disappearance test values were significantly reduced. However, the fluorescein dye disappearance test could not differentiate among normal eyes, eyes with minor epiphora, or eyes with moderate epiphora. The drop test showed a significant decrease even in patients with minor epiphora and was further decreased with increasing severity of symptoms.

The authors concluded that the drop test provided a quantitative measurement for lacrimal drainage function and was more sensitive than the fluorescein dye disappearance test.

Cortical Visual Impairment Caused by Twin Pregnancy

Good WV, Brodsky MC, Angtuaco TL, Ferriero DM, Stephens DC III, Khakoo Y. Am J Ophthalmol 1996; 122: 709-16

The purpose of this study was to report a possible relationship between twin pregnancy and cortical visual impairment.

Three children who had been the products of twin pregnancies were identified as having cortical visual impairment. One child (Patient 2), a dizygotic twin, developed cortical visual impairment after a preterm birth. Two children (Patients 1 and 3), the products of monochorionic pregnancies, developed cortical visual impairment. All children were examined ophthalmologically and neurologically.

An evaluation of the gestations of these children indicated that twin pregnancy per secal was probably etilogic in the development of cortical visual impairment. In patient 2, twin pregnancy probably caused preterm birth and resulting cortical visual impairment. In patients 1 and 3, twin-to-twin transfusion syndrome was the cause of cortical visual immurement. in patient 1, fetal demise precipitated an acute twin-to-twin transfusion syndrome.

The authors concluded that children who show cortical visual impairment at or shortly after birth should be evaluated for the possibility of twin pregnancy. Twin pregnancy increases the risk of neurologic damage, including damage to the visual cortex to optic radiations, or both.

Surgical vs Medical Manangement of Chronic Open-angle Glaucoma

Stewart WC, Sine CS, Lopresto C. Am J Ophthalmol 1996; 122: 767-74.

Thes purpose was to study patients with chronic open-angle glaucoma who had similar intraocular pressures to determine whether surgical or medical therapy was effective in preventing progressive, long-term, glaucomatous damage.

Included in this study were patients with chronic open-angle glaucoma who were followed for 3 years or longer and were treated, through either medical or surgical therapy, by adjusting intraocular pressure to 18 mm Hg or less as a therapeutic end point. We studied 31 matched pairs of patients in which one member was treated by surgery and one member had medical treatment. In every pair, we matched each patient individually by age, race, and intraocular pressure.

For the matched pairs of patients in this study, the mean intraoculr pressure following initiation of treatment was 13.5 and 13.1mm Hg for the surgically and medically treated groups, respectively (P= .475). This study found no difference between groups in the incidence of glaucomatous progression following surgical (n=3) or medical (n=3) therapy (P>.99, McNemar's test) for an average follow-up of 40.0 + 10.0 and 43.4 +8.4 months in the medical and surgical groups, respectively. The glaucoma of three patients progressed on the basis of reduced visual acuity, two by visual field, and one by disk hemorrhage. Although the types of complications from therapy differed between groups, no vision loss or life threatening events occurred directly from these treatments.

The authers concluded that when intraocular pressure is used as a therapeutic end point, both filtration surgery and medical therapy appear to be equally effective in maintaining long-term visual function and a stable optic disk in chronic open-angle glaucoma.

Scanning Laser Doppler Flowmeter Study of Retinal and Optic Disk Blood Flow in Glaucomatous Patients

Nicolela MT, Hnik P, Drance SM. Am J Ophthalmol 1996; 122: 775-83

The purpose of this study was to examine blood flow in the retina and optic nerve head of patients with primary open-angle glaucoma.

Retinal and optic nerve head blood flow of glaucoma patients and control subjects of similar age and gender were measured in arbitrary units with the Heidelberg Retina Flowmeter, a scanning laser Doppler flowmeter (Heidelberg Engineering, Heidelberg, Germany). A total of 33 glaucoma patients and 29 control subjects were included in this study.

Microvascular blood volume, flow, and velocity were analyzed in four areas of the retina approximately 100um from the edge of the optic disk (two temporal, one superior, and one inferior), in one area of the neuroretinal rim, and in the lamina cribrosa.

The glaucoma patients had significantly decreased blood volume, flow, and velocity in one temporal retinal area (P<.006) and in blood volume in the inferior retinal area (P=.04). They also had significantly decreased blood volume, flow, and velocity in the lamina cribrosa (P<.0004), which also had more areas the investigators judged to be avascular compared to control subjects (P<.0001). No differences between glaucoma and control subjects in the blood flow measurements of the neuroretinal rim were found.

The authors concluded that these findings suggest that glaucoma patients tend to have less blood volume, flow, and velocity in the lamina cribrosa and upper temporal peripapillary retina. The temporal area below the horizontal, corresponding to the papillomacular bundle, did not show this difference. The findings may be significant in the pathogenesis of primary open-angle glaucoma.

Undercorrection After Excimer Laser Refractive Surgery

Vajpayee RB, McCarty CA, Aldred GF, Taylor HR and The Excimer Laser Group
Am J Ophthalmol 1996; 122: 801-7

The purpose of this study was to find out the incidence and correlations of undercorrection 1 year after excimer laser surgery for myopia or myopic astigmatism.

A consecutive series of 645 eyes of 440 patients were studied. Eyes were examined preoperatively and at 1,3,6, and 12 months after surgery. The parameters evaluated were visual acuity, refraction and corneal clarity.

Following excimer laser surgery, undercorrection of > -1.00 diopters gradually increased from 10% at 1 month to 40% at 12 months. Increasing degree of preoperative myopia was significantly associated with increasing occurrence of undercorrection at 3 months (X2=17.3, P<.001), 6 months (X2 =53.6, P < .001,), and 12 months (X2=64.8, P < .001). Undercorrection was more common in eyes that had had photorefractive keratectomy than in those that had had photoastigmatic refractive keratectomy (odds ratio, 0.40; 95% confidence interval, 0.25 to 0.60). At 1 year, a loss of 2 or more lines of best-corrected visual acuity was recorded in 38% of undercorrected patients. Loss of 2 or more lines of best-corrected visual acuity was more common in patients undercorrected by -1.00 diopter or more (oods ratio, 8.8; 95% confidence interval, 5.4 to 14.6). No relationship was seen between corneal haze and loss of best-corrected visual acuity. Undercorrection was not assoiated with age, gender, use of nonsteroidal anti-inflammatory drugs, bandage contact lens wear, or corneal haze. Patients with lower degrees of myopia reached a stable refraction more quickly. At 6 months, 71% were within + 0.5 diopter of 1-year refraction. Of 17 patients with undercorrection who were treated with topical corticosteroids, only one patient showed a permanent benefical change.

The authors concluded that occurrence of undercorrection is more common in patients with severe myopia and when simultaneous astigmatic corrections are undertaken.

Correlation of Tear Lipid Layer Interference Patterns With the Diagnosis and Severity of Dry Eye

Yokoi N, Takehisa Y, Kinoshita S.
Am J Ophthalmol 1996; 122: 818-24

The purpose of this study was to observe and classify tear film lipid layer interference patterns in normal volunteers and dry eye patients and to investigate the relation between the lipid layer interference patterns in the dry eyes and the results of other dry eye examinations.

Precorneal tear lipid layer interference patterns were observed at the central cornea in 25 eyes of 13 normal controls and 85 eyes of 48 dry eye patients. Observed patterns were classified in masked fashion by five physicians into five grades: grade 1, somewhat gray color, uniform distribution; grade 2, somewhat gray color, nonuniform distribution; grade 3, a few colors, nonuniform distribution; grade 4, many colors, nonuniform distribution; and grade 5, corneal surface partially exposed. Other methods of dry eye examination were also performed, including the cotton thread test, the Schirmer I test and modified Schirmer I test, measurement of tear film breakup time, scoring of corneal fluorescein staining density (grades 0 to 3) and area (grades 0 to 3), and rose bengal staining (grades 0 to 9).

In 92 (84%) of 110 eyes, four or more of the five physicians agreed in their grade classifications. Among the 92 eyes, normal control eye were classified into grades 1 and 2 (10 and 12 eyes, respectively) and dry eyes were classfied into grades 2,3,4, and 5 (22,26,10

and 12 eyes, respectively). There was significant correlation between the grading and the results of other dry eye examination modalities, including fluorescein staining, rose bengal staining, and tear film breakup time.

The authors concluded that tear lipid layer interference patterns are highly correlated with dry eye severity.

Long-term Fluctuation of Relative Afferent Pupillary Defect in Subjects With Normal Visual Function
Kawasaki A, Moore P, Kardon RH
Am J ophthalmol 1996; 122: 875-82

The purpose of this study was to determine whether the relative afferent pupillary defect (RAPD) remains constant over time in normal subjects.

Seventeen normal subjects were tested with infrared pupillography and automated perimetry in four sessions over 3 years. The changes in RAPD and visual field asymmetry between testing sessions were compared.

The range of RAPD was 0.0 to 0.3 log unit, and the difference in the mean deviation between the eyes on automated static perimetry was 0 to 3 dB. Eight subjects repeatedly had an RAPD in the same eye. There was no correlation between the RAPD and the visual field asymmetry at the same visit. Changes in the magnitude of the RAPD between any two session were typically small (median, 0.08 log unit; 25th percentile, 0.04 long unit; 75th percentile, 0.15 log unit).

The authors concluded that some normal subjects may show a persistent but samll RAPD in the absence of detectable pathologic disease. Therefore, an isolated RAPD in the range of 0.3 log unit that is not associated with any other significant historical or clinical finding should probably be considered benign.

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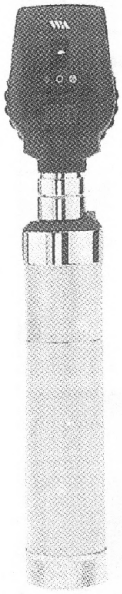

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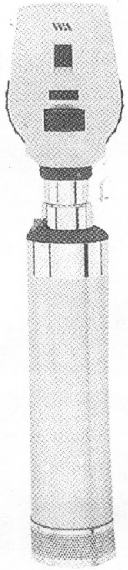

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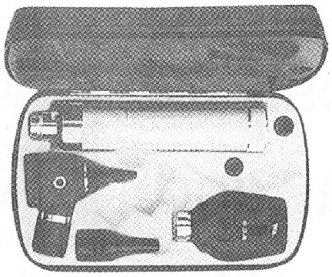

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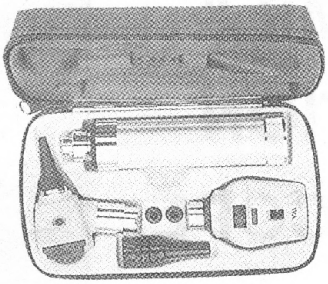

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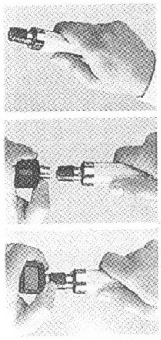

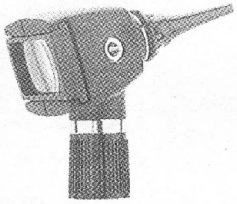

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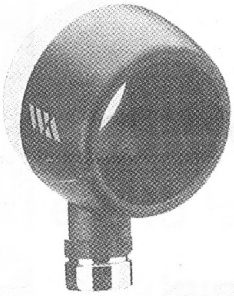

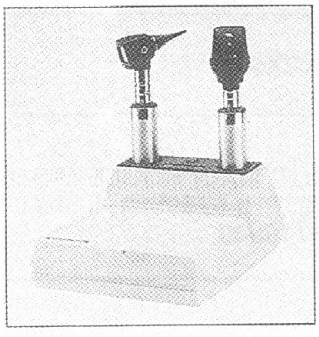

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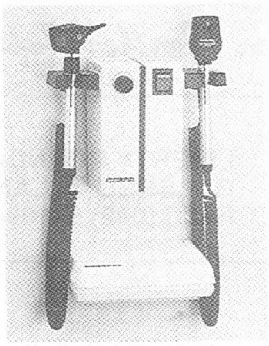

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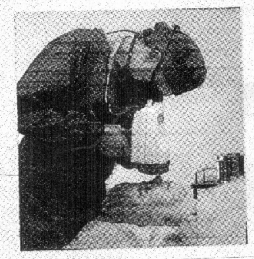

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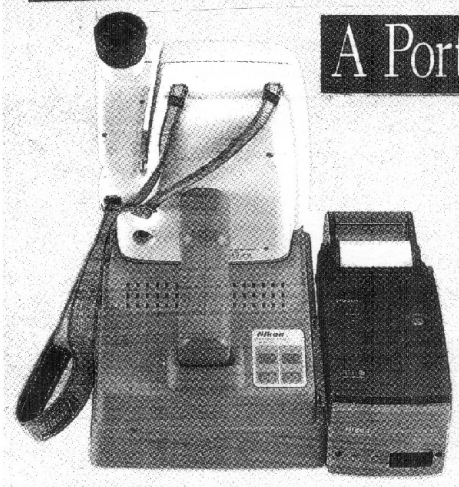

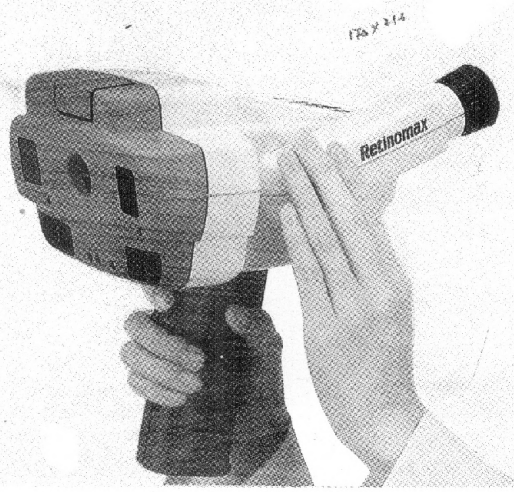

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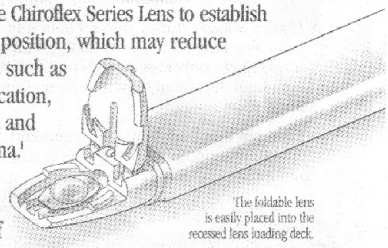

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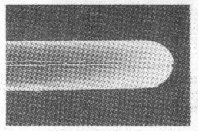

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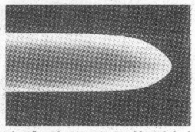

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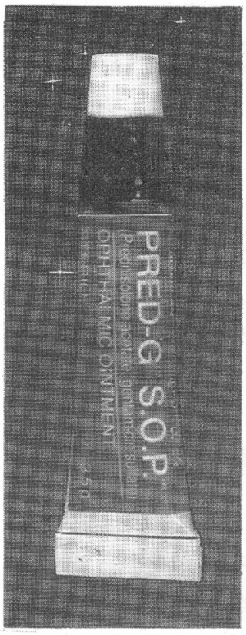

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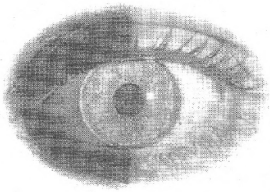

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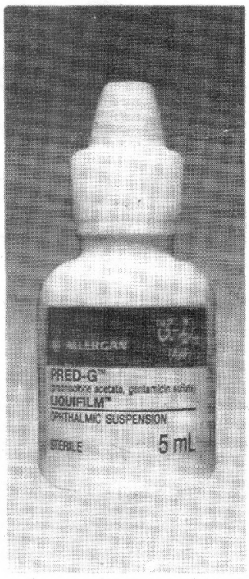

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CHIBROXINE* (norfloxacin, MSD) is a 0.3 percent sterile solution of norfloxacin for topical use in the eye. Norfloxacin is a synthetic fluoroquinolone broad-spectrum antibacterial agent with activity against Gram-positive and Gram-negative aerobic 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^{-8}–10^{-10}). 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 of 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, Hafnia alvei + **Haemophilus influenzae, H. aegyptius** (Koch-Weeks Bacillus), Klebsiella oxytoca, Klebsiella pneumoniae, Klebsiella rhinoscleromatis + Moraxella species, Morganella morganii + Neisseria 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 smarting, 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 insterred tip. **STORAGE:** Protect from light. Store at room temperature. *Trademark Physicians Circular

MSD

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

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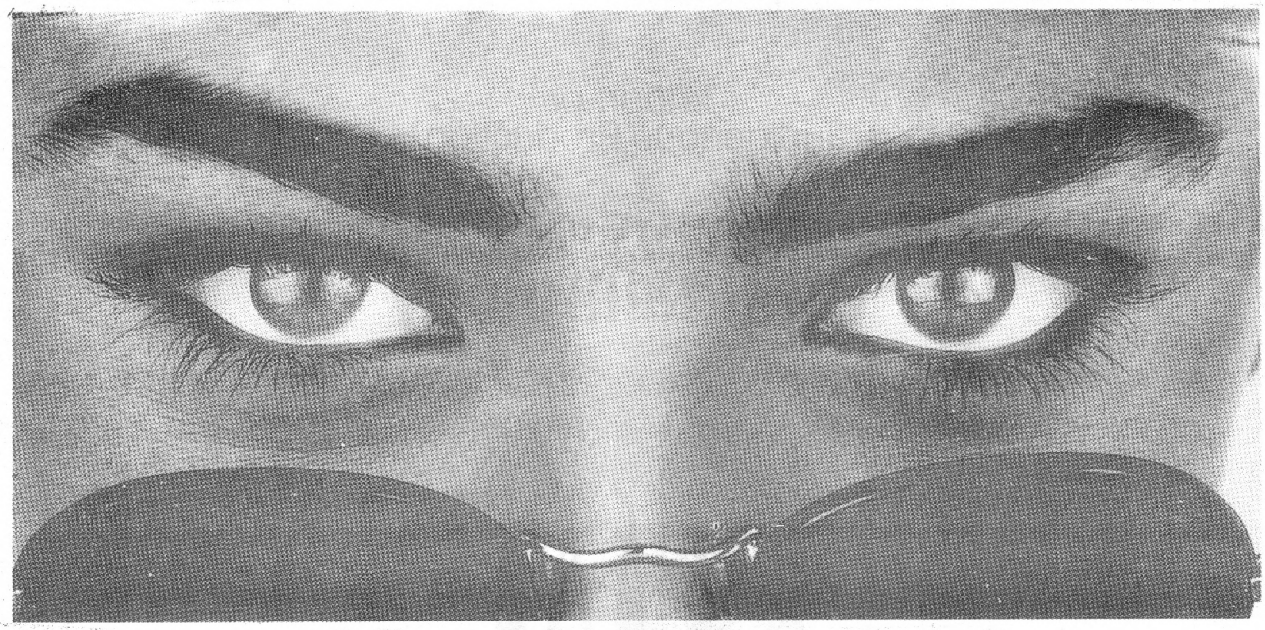

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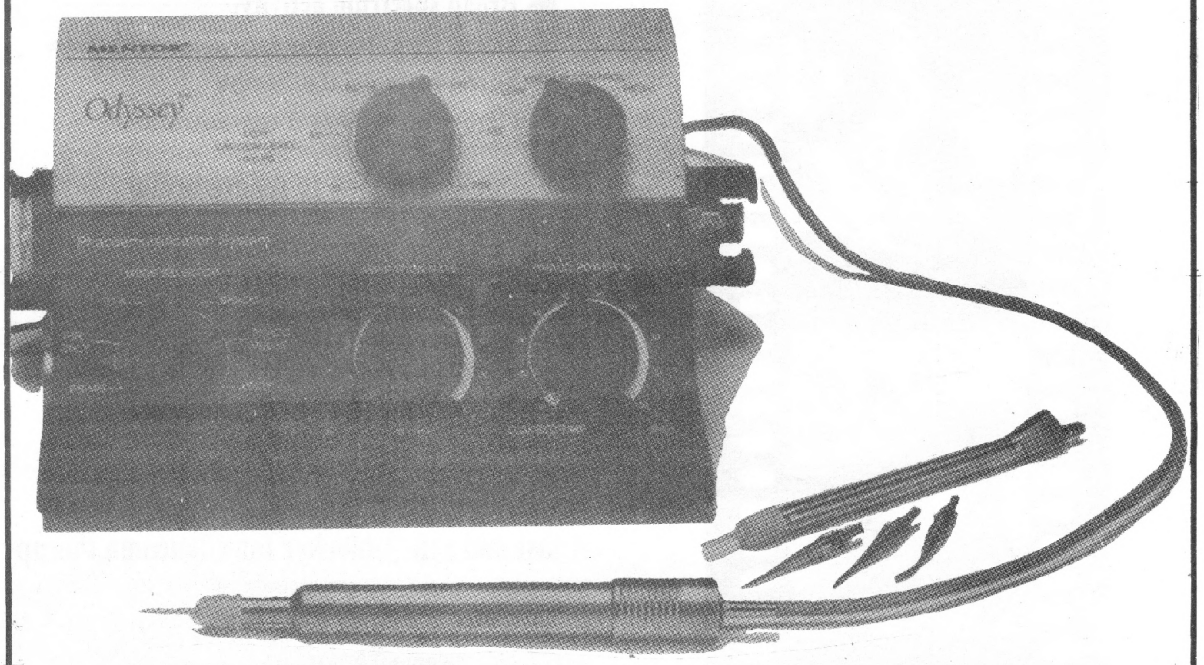

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Safe
- No increase in IOP even in steroid responders.[2,3]

Analgesic action
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4. Ariene Gwon MD. Elizabeth K Vaughen MD, CLAO Journal Vol. 20, No. 2. April 1994.

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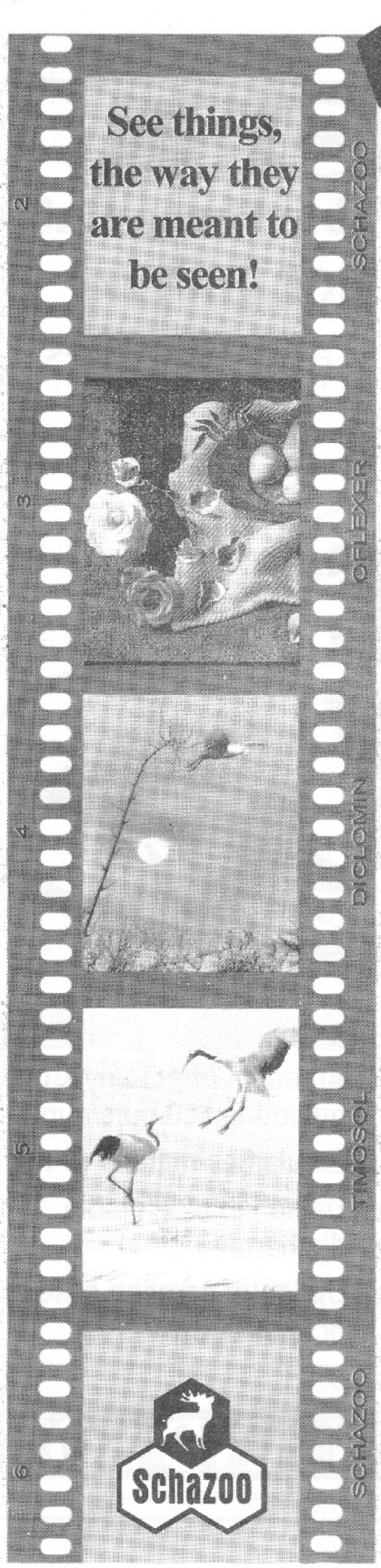

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- Sure bactericidal efficacy[3]
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R E F E R E N C E S

1- PDR Ophthalmology 1995
2- (SO: Br-J-Ophthalmol 1992 Nov; 75(11): 675-9).
3- (SO: Yen-Ko-Hsueh-Pao 1994 Dec;10(4): 251-3).
4- (SO: Br-J-Ophthalmol 1995 Jun; 79(6):606-9)
5- (SO: J-Cataract-Refract-surg 1995 May; 21(3): 309-12)
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9- 'Comparison between timolol & levobunolol' showing percentage of withdrawals M Ober et. al., Br. J. Ophthal., 1985-69,593).
10 & 11- (AFHS, Drug information 92, page 81705).

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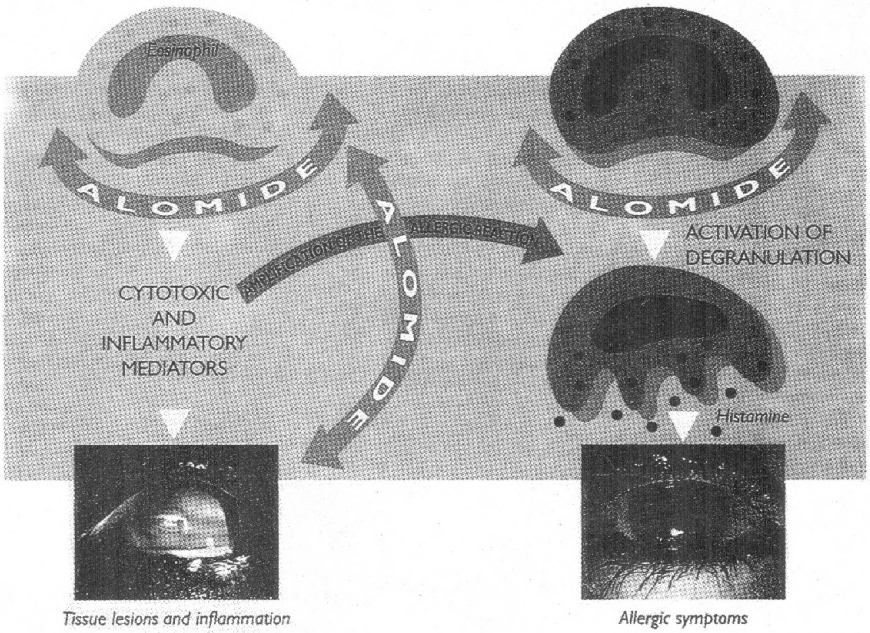

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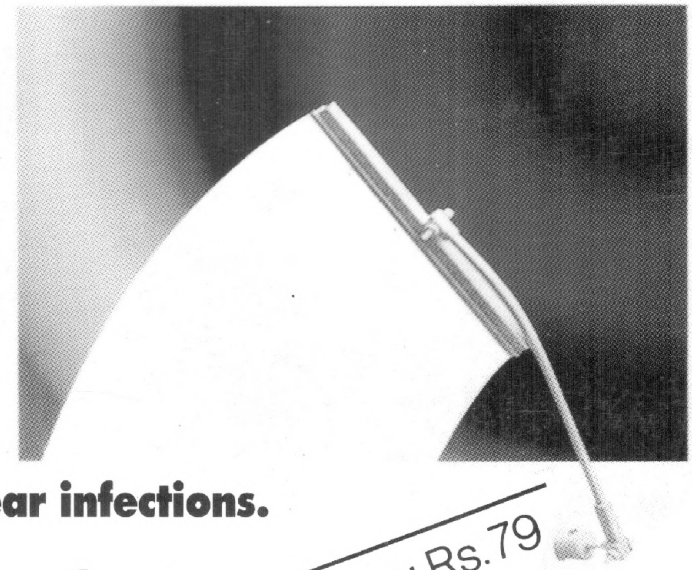

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