A GUIDE TO OPTOMETRIC EYE CARE

FOR THE

PRE AND POST-OPERATIVE CATARACT PATIENT

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INTRODUCTION

In 1989 it is estimated that over 1 million cataract extractions will be performed in the United States. In fact, cataract extraction is the most frequent surgery in patients older than 65 (1). As the intraocular lens (IOL) patient population increases it is important that optometrists receive a thorough understanding of the pre and post-operative responsibilties of managing the cataract patient.

The emphasis of this article is pre and post-operative management of planned extracapsular cataract extraction (ECCE) with nuclear expression and phaco-emulsification. In the future the optometrist may become more involved with this aspect of care. The following discussion will assist the clinician in identifying pre and post-operative complications, expected refractive changes that occur following surgery, the time periods in which complications most often occur, and the proper co-management for each complication.

PRE-OPERATIVE CARE

In many respects the preparation for surgery is more demanding of both patient and surgeon than the operation itself. The referring optometrist must recognize the patient's right to understand, at least in general terms, the goals of the surgery, as well as the more common and important risks. It is not uncommon for patients to be reluctant to be referred to the cataract surgeon. In fact,

some patients have preferred to keep their cataracts because of their fear of surgery.

As in most areas of medical practice, the patient's history is all-important. The history will help determine whether or not surgery is necessary. It might also indicate the need for specific modifications of the surgical technique to be used as well as special precautions that should be taken.

The pre-operative evaluation should be performed under conditions that are as comparable as possible to real-life situations. Distance vision should be tested in dim and bright illumination. Near vision should be tested as well since it is not uncommon for a difference to exist between the distance and near visual acuity in patients with cataracts. Patients with nuclear sclerotic lenticular changes tend to have better near than distance acuity. They also tend to show an increase in myopia refractively. On the other hand, patients with posterior subcapsular cataracts will frequently have better distance than near acuity. Visual acuity should be tested with habitual prescription, habitual prescription and pinhole together, and with the prescription that provides the best visual acuity.

Pinhole acuity may be misleading in patients with nuclear sclerotic cataracts. For example, pinhole acuity may be 20/30 but best corrected visual acuity may be 20/60. This discrepency is probably related to a decrease in diffraction of light that a pinhole provides.

Cataracts should be removed based on a individual's needs, not solely on best visual acuity obtained. The surgeon should understand clearly the visual requirements of each patient as an individual. In modern society, one frequently assumes that every individual needs vision good enough to permit reading, driving, television viewing, and similar visual tasks. However for those whose visual requirements are not so demanding, the indications for cataract surgery might be less attractive. For example, a draftsperson or bus driver may be functionally disabled with 20/25 to 20/30 acuity. On the other hand, a 75 year old non-reader may function fine with 20/60 to 20/80 visual acuity.

Biomicroscopy along with tonometry should be performed. The following slit lamp findings are significant if discovered during the pre-operative evaluation. Corneal quttata indicate corneal endothelial dysfunction that might result in clinically significant corneal decompensation following surgery. The patient that presents with guttata should receive a specular microscopy endothelial cell count which is usually performed at the surgeon's office. A low cell density of 1000mm squared or less will usually require and ECCE procedure rather than phacoemlsification, as phacoemulsification has a greater chance of leading to corneal complications following surgery than does ECCE [2].

As a general rule, the surgeon wll perform cataract extraction if glaucoma and/or anterior uveitis is presently under control. In

most cases control will be no more difficult, and in fact may be more easily achieved post-operatively.

Next to visual acuity the most important part of the pre-operative examination is the funduscopic exam. In the presence of advanced cataract changes the fundus can best be seen through a widely dilated pupil with the use of the binocular indirect ophthalmoscope. One should attempt to evaluate the macula, optic disc, and the periphery, particularly for evidence of retinal tears, detachments, or tumors.

The clinician is often confronted with the patient who has an inmmature cataract or an opacification of the posterior capsule following surgery. Often these patients also have concurrent eye disease that could adversly affect post-operative or post-laser visual acuity such as age-related macular degeneration, open angle glaucoma, high myopia, amblyopia or a combination of these ocular diseases. The decision of surgical or laser intervention in the presence of concurrent eye disease would be greatly facilitated by an inexpensive, objective, pre-operative measurement of obtainable post-operative visual acuity. There are 2 instruments that are commonly used to measure the predicted acuity post-operatively by attempting to bypass the cataract, the potential acuity meter (PAM) and the laser interferometer (LI).

The PAM attaches to a slit lamp and permits projection of Snellen optotypes onto the patient's retina through a 0.2mm squared aperture in the lens opacity, if one can be found (3). It is

generally reliable, but its accuracy is decreased if the patient has advanced glaucoma (4).

The LI, a low power laser, produces coherent light, and this can be used to produce grid (grating) patterns of various widths onto to the retina. These patterns are little affected by lens opacities. There is a tendency for this test to overestimate acuity, especially in patients with coexisting amblyopia (5). If this equipment, either the PAM or LI, is not available to the optometrist, the referring surgeon needs to perform one of these tests when indicated.

When the optometrist and the patient have decided that cataract surgery is indicated, the patient should be told what to expect. Explain that the cost of surgery is approximtely $2200.00. Medicare typically will cover 80% of the cost, and any other medical insurance the patient has, may cover the rest. Surgery will usually take about 25-30 minutes and the patient will usually spend a total of 2-3 hours in the hospital. Local anesthesia remains the method of choice for most ophthalmic surgeons when performing cataract surgery. This means the patient will usually be awake during the surgery. Retrobulbar injection is used to control pain and eye movements.

Explain to the patient that activity will be restricted after surgery. Strenuous activity and rubbing of the eye are prohibited because the wound may break open. Patients should not lift more

than 10 pounds during the first 6 weeks after surgery. Bending at the knee is permitted, but stooping over is prohibited.

Ordinarily, when cataracts are present in both eyes, the worse eye is operated on first. If the patient has a favorable visual result, he or she may wish to have the second eye operated on in order to regain binocualr vision, if they ever had it. An interval of 3-6 months between surgery is customary.

Patients that have jobs that require heavy lifting or other vigorous activities may have to take a leave of absence from work or switch to a desk job. Sometimes, especially for the elderly, it's more convienent to plan for a particular season of the year.

Generally, cataract surgery has favorable results. In fact, success (20/20 - 20/40 post-operative acuity with no or minimal complications) occurs greater than 90% of the time. There will be more information on this to follow.

After you have discussed the various aspects of cataract surgery with the patient, an appropiate referral to the ophthalmic surgeon needs to be made. The patient will need to go to the surgeon's office prior to surgery. There are measurements that need to be made prior to surgery to determine the IOL power. The measurements include the axial length of the eye and keratometric readings of the cornea. The axial length, called an A-scan, is performed using ultrasound.

It is very imporatant that you are familiar with the surgeon's usual pre-operative, operative, and post-operative routines. Spending time in the surgeon's office and the operating room is the best way to obtain this knowledge. Make sure you and the surgeon provide the same information and instruction to the patient.

OPERATIVE CARE

As indicated in the introduction the surgical techniques that my report include are phacoemulsification and planned extracapsular cataract extracton with nucleus expression. Both of these procedures are listed below.

The phacoemulsification surgical procedure is as follows:
A bridle suture is placed in the superior rectus tendon. Fornix-based conjunctival flap is developed for 8 mm. Hemostasis is obtained using electrocautery. A two-stepped beveled incision is made with opening of the anterior chamber. Healon is placed in the anterior chamber and an anterior capsulotomy is performed. The phacoemulsification unit is placed in the anterior chamber, and the nucleus is removed. The irrigation and aspiration unit is placed in the anterior chamber, and cortical material is removed. The posterior capsule is polished. A posterior chamber lens is inserted in the capsular bag under Healon without difficulty. Healon is replaced with balanced salt and Miostat solution. The wound is closed using 2-0 nylon figure-of-eight and single 8-0 Vicryl interrupted sutures. The wound is inspected with no

evidence of any leak. The conjunctival flap is reapproximated. 1 cc of Gentamicin is placed in the superior cul-de-sac. 0.5 cc of Celestone is placed in the inferior cul-de-sac. Timoptic and Maxitrol are placed in the eye followed by a patch and shield.

The planned extracapsular cataract extraction is as follows: Following adequate anesthesia, the eye is prepped and draped. A lid speculum is placed and 1/2 cc of Gentamycin is injected in the inferior cul-de-sac. Bridle suture of 6-0 silk is placed through the superior and inferior rectus tendon. The fornix-based conjunctival flap is developed 120 degrees. Hemostasis is obtained using electrocautery. The first step of a two-stepped beveled incision is made with opening into the anterior chamber, a small 2 mm. incision. The cystotome is introduced and anterior capsulotomy performed. Nucleus is freed and the wound is opened to its full extent. The nucleus is expressed and the wound is partially closed at 10 o'clock and 2 o'clock with 8-0 vicryl suture. Irrigation and aspiration unit is placed into the anterior chamber and cortical material removed. The posterior capsule is polished. 10 o'clock vicryl suture is removed and the air followed by Healon is placed in the anterior chamber. Posterior chamber intraocular lens is then introduced and positioned. Air and Healon are replaced with balanced salt and Miochol solution. The 10 o'clock vicryl suture is replaced and a peripheral iridectomy is performed.

10-0 nylon figure of 8 interrupted sutures are used to complete wound closure. The wound is tested. There is no evidence of any

leakage. Conjunctival flap is reapproximated. Vicryl sutures are removed. 1/2 cc of Celestone is injected into the inferior cul-de-sac. Lid speculum is removed. Maxitrol ointment and Eserine ointment are placed in the eye followed by patch and shield, and the patient returned to the recovery room in good condition.

POST-OPERATIVE CARE

Critical evaluation of the operated eye during the immediate post-operative period is extremely important. The surgeon's ability to minimize operative trauma will be evident at this time. There is a tendency for a rapid recovery of the eye in appearance over the first few days following surgery. The recovery period proceeds much more slowly over the weeks that follow.

The standard of practice is to perform cataract surgery on an outpatient basis, making it necessary for patients to return for follow up care post-operatively at 1 day, 1 week, 3 weeks, and 8 weeks. At 8 weeks the eye is evaluated and in most cases is stable in the healing process and a refraction is performed. The next visit will be scheduled in 4-6 months, then on an annual basis. The post-operative care provider should remember that complications can occur at any time following surgery. Although post-operative complications usually occur in an predictable fashion it is important to remember that they can occur at any time following surgery. Patients will depend on the clinician for evaluation of symptoms and whether or not they are expected post-opreatively. The follow-up examination should be geared toward

uncovering the cause of these symptoms so that proper management can be provided.

ONE DAY POST-OPERATIVE

The pressure patch is removed and visual acuity should be checked uncorrected then with a pinhole. The vision may range from light perception to 20/20. Pinhole visual acuity will help reveal the potential best visual acuity achievable with a refraction.

It is normal for patients to experience pain a day or two following surgery. They may describe mild discomfort or foreign body sensitivity. Severe pain needs to be evaluated and the following complications need to be ruled out. Corneal abrasion, an exposed suture, corneal edema, elevated intraocular pressure, a marked anterior chamber reaction, or endophthalmitis.

The clinician must perform a thorough slit lamp examination. Normal findings will include lid edema, ptosis, subconjunctival hemorrhage, conjunctival injection, corneal edema, Descemet's folds, and moderate cell and flare in the anterior chamber. The above findings will vary in degree of severity.

The corneal epithelium should look clear and wet. Marked stippling or filamentary keratitis should be brought to the surgeon's attention. Corneal edema will usually be present especially superiorly. Mild edema may be caused by manipulation

of the cornea during surgery. Descemet's folds, subepithelial microcysts, corneal thickening, and vertical striae deep in the stroma are all signs of edema. Also high intraocular pressure (IOP) can contribute to or cause corneal edema. Treatment of elevated IOP will be discussed later.

The wound area needs to be examined carefully. A conjunctival flap might obscure the sutures. Nylon sutures most likely will be present in the limbal area from 10 o'clock to 2 o'clock. The number and position are dependent on the type of surgery performed. The wound area can be examined by performing a Seidel Test. Aqueous leaking from the wound can be detected instilling fluorescein dye directly to the wound and observing the color of the dye with the cobalt blue filter. Leaking aqueous will appear bright green in color and may flow down the cornea. A low intraocular pressure is a warning sign that a wound leak may be present. Management of a wound leak will be discussed later.

The position of the IOL needs to be evaluated. The IOL should be properly positioned in the posterior chamber with an intact posterior capsule. Patients with a decentered lens may complain of glare and ghost images.

Undilated ophthalmoscopy should be performed one day post-operatively. The fundus may appear hazy due to the corneal edema. Special attention should be paid to the possibility of posterior uveitis, cystoid macular edema, and retinal detachment. Posterior uveitis and retinal detachments can be observed with

ophthalmoscopy. Cystoid macular edema may have a subclinical appearance and may only be properly diagnosed with fluorescein angiography. The time periods and managements of these post-operative complications will be discussed later.

The patient needs to wear either glasses or a metal shield during the day and a metal shield at bedtime. The metal shield (such as a Fox perforated aluminum shield) can be taped in place to prevent accidental ocular trauma. Restricted activity, especially during the first three weeks, is very important for the patient. Lifting needs to be restricted to 10 pounds. Bending at the knee is permitted, but stooping over is prohibited.

A topical antibiotic and steroid will be dispensed to the patient post-operatively at the first visit. Most commonly an antibiotic steroid combination will be used (ie. Maxitrol ophthalmic suspension which is Neomycin Sulfate, Polymyxin B and Dexamethasone 0.1%). The dosage is one drop q.i.d. for 3 weeks,and then b.i.d. for 2 weeks. Corticoids suppress the inflammatory response to a variety of agents and they probably delay or slow healing. Since corticoids may inhibit the body's defense mechanism against infection, a concomitant antimicrobial drug may be used when this inhibition is considered to be clinically significant in a particular case.

Many surgeons will decide to use a mydriatic following surgery to prevent post-operative miosis. Ocufen (flurbiprofen sodium) is a topical nonsteroidal anti-inflammatory product for ophthalmic use.

It's mechanism of action is believed to be through inhibition of the cyclooxygenase enzyme that is essential in the biosynthesis of prostaglandins. Prostaglandins appear to play a role in the miotic response produced during ocular surgery by constricting the iris sphincter independently of cholinergic mechanisms. In clinical studies, Ocufen has been shown to inhibit the miosis induced during the course of cataract surgery (6). Ocufen can be used t.i.d. for 1 week following surgery.

ONE WEEK POST-OPERATIVE

The gradual recovery of the post-operative eye to a more normal appearance usually is dramatic over the first several days and than proceeds more slowly over subsequent weeks.

At the one week visit the patient will usually report the vision is improving although a mild foreign body sensation may be present. Visual acuity should be taken uncorrected and then with pinhole.

Biomicroscopy should reveal less corneal folds. A mild anterior chamber reaction may still be present, and the IOL should be in postion. The wound should be evaluated. IOP should be less than 21mm Hg.

Ocufen should be discontinued but Maxitrol should continue to be used q.i.d. in the post-operative eye. Restricted activity should remain the same. The shield or glasses should be worn daily and

the shield worn while sleeping. The patient needs to return in two weeks.

THREE WEEKS POST-OPERATIVE

Case history should be taken and the patient should state the post-operative eye is more comfortable and is improving in vision.

Visual acuity uncorrected and with a pinhole needs to be tested. A refraction also should be performed and provide visual acuity in the 20/20-20/40 range. The exception to this is if there are pre-existing ocular conditions to cause a decrease in vision.

Biomicroscopy may reveal minor corneal edema with few or no corneal folds in Descemet's membrane. The anterior chamber should be clear and quite. The IOL should be in position. The IOP should be below 21mm Hg.

If there is no apparent reason for decreased vision after the refraction and biomicroscopy is performed, the patient should be dilated, and ophthalmoscopy performed. The optometrist should obtain a binocular view of the posterior pole, especially the macular area. If the cause of the decreased visual acuity is still unknown, the patient should be referred back to the ophthalmologist.

Reduce the Maxitrol to b.i.d. for 2 weeks or until the bottle is empty. Restricted activity needs to be maintained. The shield

needs to be worn at bedtime. The patient should return in 3-5 weeks.

SIX TO EIGHT WEEKS POST-OPERATIVE

Case history should be unremarkable with the exception of blurred vision. Visual acuity should be tested uncorrected and with pinhole. Refraction should be performed and a spectacle prescription is given to the patient. The exception to this is when a moderate degree of refractive astigmatism exists.

The surgical incision can be the origin of large differences in amounts of corneal cylinder. Wound gap superiorly will produce against-the-rule (ATR) astigmatism while wound compression superiorly will produce with-the-rule (WTR) astigmatism (7).

In general, patients will show 2-3 diopters of WTR astigmatism after surgery. This is a good sign because there is progression toward ATR cylinder as the sutures and wound loosen. At 6-8 weeks following surgery spectacles can be prescribed, but the tendency toward ATR astigmatism will continue for the next several months. It may be necessary to change the prescription either at the 6 month or 1 year follow-up examination.

The patient should be sent back to the surgeon when post-operative astigmatism differs from the pre-operative astigmatism by more than 1.50 diopters at the 6-8 week examination. The surgeon may elect to cut a suture to alter the corneal refractive cylinder.

Sutures should not be cut during the first 6 weeks after the surgery bacause a wound rupture may occur.

The cornea should be clear, the IOL should be in proper position and the IOP should be below 21mm HG. Dilated ophthalmoscopy only needs to be performed if there is an unexplainable decrease in vision or if the patient is complaining of flashes and/or floraters.

The patient can discontinue the shield and full activities may be resumed. The patient should be instructed to contact the surgeon or the optometrist if complications develop. The patient needs to return to the optometrist's office in 6 months.

SIX MONTHS POST-OPERATIVE

A case history should be taken. Visual acuity is measured with correction. A refraction should be performed. An increase in ATR cylinder with approximately the spherical equivalent that the patient is presently wearing is expected.

Biomicroscopy should reveal no edema. IOL should be in position and IOP should be below 21mm Hg. A dilated fundus exam is important since retinal detachments most commonly occur at 6 months. The retina should be evaluated with the binocular indirect ophthalmoscope. The macular area should be evaluated with a 90 diopter or fundus contact lens.

If the exam is unremarkable with the exception of a refractive change, the patient need not return for one year. The one year follow-up exam should be the same as the 6 month exam.

POST-OPERATIVE COMPLICATIONS

INTRAOCULAR PRESSURE

Measuring Intraocular pressure (IOP) needs to be performed on each visit during the first 2 months post-operative and every 6 months thereafter during routine follow-up examination. A high IOP (>25mm Hg) may be caused by pupillary block or by inflammatory debris blocking the trabecular network.

Early pupillary block requires immediate medical management. The patient should be referred to the surgeon. Management involves treatment with carbonic anhydrase inhibitors along with osmotic agents. Also, vigorous attempts at dilating the pupil should be made using Atropine and Phenylephrine solution applied repeatedly. If ineffective, a laser iridotomy or other surgical intervention may be considered.

Some patients may show elevated IOP caused by steroid eye drops which are used to control the inflammation post-operatively. This increase in pressure will usually be seen at either 1 week or 3 weeks post-operatively. This problem is solved by switching to another topical steroid less potent, but also less likely to cause a steroid response. It may be necessary to add a beta-blocker or

Diamox initially to reduce the IOP. When the IOP is lower than 21mm Hg, the glaucoma medication can be discontinued.

A later complication, usually after 3 months, that increases IOP is pigment particles that are deposited in the anterior chamber. Pigment may also be deposited on the anterior surface of the IOL and/or the corneal epithelium. These patients are best controlled with topical glaucoma medication until IOP is below 21mm Hg.

A general guideline to follow for reduction of IOP is; less than 25mm Hg, monitor; 25-30mm Hg can be managed with either Timoptic or Betoptic; greater than 30mm Hg, Diamox or Neptazane should be used. Timoptic should be avoided in patients with asthma or bradycardia. Diamox and Neptazane can be systemic poisons so long-term use should be avoided. In no case should Epinephrine or Propine be used as these drugs increase risks of cystoid macular edema.

CHOROIDAL DETACHMENTS

Detachment of the choroid, often including the pans plana of the ciliary body, may follow a wound leak. Correspondingly, the IOP may be reduced. This complication is quite uncommon now that secure wound closure has become a routine procedure. Ocular hypotony and a shallow chamber may occur if aqueous is draining abnormally through a cyclodialysis cleft. A cyclodialysis cleft is an opening accidentally created during surgery. The aqueous drains into the suprachoroid space. In those cases in which it

occurs, retinal consultation is advisable with the referring surgeon. The surgeon may close the openings with the argon laser photocoagulation. The onset of choroidal detachment usually is 1-2 weeks following surgery, and the entire course usually is no longer than 1-2 weeks (8).

FLAT ANTERIOR CHAMBER

A flat anterior chamber is another finding associated with wound leak, but most often is due to ciliary body shut-down. A low IOP will also be seen. The wound area needs to be examined carefully by performing a Seidel Test. Aqueous leaking from the wound can be detected by instilling fluorescein dye to the wound and observing the color of the dye with the cobalt blue filter. Leaking aqueous will appear bright green in color and may flow down the cornea. The patient who presents with a positive Seidel should be seen again in 24 hours and if a positive Seidel is still present, the surgeon should be contacted for possible surgical intervention.

Instead of aqueous leaking into the tear film, it may leak under the conjuctiva. A conjunctival bleb may develope, much like the filtering blebs for glaucoma. The surgeon needs to be contacted if this is seen.

HYPHEMA

A hyphema may appear in the anterior chamber following surgery. The hyphema will usually resolve spontaneously within a few days. The patient should return every other day until the hyphema has resolved. The surgeon should be notified if the hyphema increases or does not resolve as it can result in increased IOP or the cornea may be stained with blood.

DISLOCATED / DECENTERED IMPLANTS

Posterior chamber lenses are the most common IOL's used. A posterior chamber implant has the optical portion and haptics located behind the plane of the iris. Rigid IOLs are generally placed in the capsular bag. Some of the newer soft implants have their haptics placed in front of the capsular bag in the ciliary sulcus (9). Fortunatly, IOLs are generally quite stable in the eye. However, in those cases where there is inadequate support, the implant may displace inferiorly; this may occur over several days. The term sunset syndrome is used in such cases. If the implant is within the surgeon's reach, the treatment is to reposition it or remove it and replace it with another IOL.

There are also cases in which the implant does not sublex inferiorly but seems to move within the posterior chamber with ocular motion. Often this movement is of pendular nature and is given the name of wind shield wiper syndrome. Another syndrome involving posterior lens position is the sunrise syndrome. This is caused by one haptic loop, usually the inferior loop, being inserted in the capsular bag and the other loop being inserted in

the ciliary sulcus. The optic of the implant is seen to displace away from the loop that is in the capsular bag and when this is excessive the patient will have simultaneous phakic a pseudophakic vision. The lens will be well fixated but not optically centered (10). The surgeon may need to reposition the implant.

ENDOPHTHALMITIS

Endophthalmitis is probably the most severe complication associated with cataract surgery. Fortunately, it is very rare. There are 2 forms of endophthalmitis; infectious or sterile. Infectious endophthalmitis usually appears as a severe inflammatory reaction within 24-48 hours following surgery. The patient will experience severe pain, redness, chemosis, a marked anterior chamber reaction and a vitritis. Vision is usually reduced to light perception. A hypopyon may develop and the eyelids may swell. The surgeon needs to be contacted immediatly and aggressive treatment will be initiated as soon as possible. Treatment includes periocular antibiotics and steroids, a vitrectomy with intraocular antibiotics and intravenous antibiotics. Even if the endophthalmitis resolves, the intense inflammatory reaction and the treatment measure used may leave the patient with poor vision.

Sterile endophthalmitis can be caused by retained cortical lens material or exposure to certain chemicals or medication used during surgery. Inflammation from a sterile endophthalmitis is slightly less severe than that which accompanies a bacterial

infection. Patients with sterile endophthalmitis experience little or no pain and lid edema. Periocular and/or topical steroids are used and there usually is a favorable prognosis.

CYSTOID MACULAR EDEMA

Cystoid macular edema remains one of the most frustrating situations for disappointing results following catract surgery. The edema appears most frequently 1-3 months following surgery. The etiology of the edema is unclear but occurs frequently if the posterior capsule is ruptured or when the vitreous is disturbed in some way.

The scenario usually includes good results initially following surgery, then the central visual acuity drops from 20/25 to as low as 20/200. Cystoid macular edema occurs when the parafoveal capillaries leak. It probably relates to the release of prostaglandins which are the chemical mediators of inflammation (11). It will appear as small clear or yellowish intra-retinal cysts centered over the fovea. The foveal reflex may also be absent. This is best detected with intravenous fluorescein angiography but may also be detected with a fudus contact lens or a 90 diopter condensing lens.

In most cases resolution is spontaneous but may take several years. For consistent cystoid macular edema that is associated with vitreous abnormalities, the surgeon can improve vision by

either performing an anterior vitrectomy or lysing the vitreal strand with a Nd:Yag laser.

RETINAL DETACHMENT

Retinal detachment following cataract surgery occurs in 3.2% of the cases of ECCE. Reports of retinal detachment following phacoemulsification show retinal detachment rates ranging from 1.3% to 3.6% (12). Most often, the detachment occurs within the first 2 years following surgery, particularly within the first 6 months (13).

Patients must be educated to promptly report any symptoms which may signal retinal detachment or vitreal-retinal traction to the surgeon immediatly. These symptoms include a curtain obstructing vision, flashing lights, or new floaters. There may be a reduction in vision but in some areas, especially peripheral detachments, the vision may remain good.

Naturally patients predisposed to retinal detachment, such as those having lattice degeneration, moderate to high myopia, or a retinal detachment in the fellow eye, are at greater risk than patients without these factors. For this reason, it is important that dilated fundus exams with binocular indirect ophthalmoscopy be performed on a regular basis following surgery.

CAPSULAR CLOUDING/ SECONDARY MEMBRANE

The development of secondary membranes is a common sequel to extracapsular cataract extraction. Opacification of the posterior capsule occurs at the rate of 20% per year in patients operated on using any extracapsular technique. Usually, this involves opacification of the posterior capsule as a result of persistent lens fibers. In addition, persistent subcapsular lens epithelium may undergo abberrant attempts at regeneration of lens fibers, producing the "fish egg" appearance of Elschnig's pearls (13).

The Nd:Yag laser is widely available for posterior capsulotomy, and, while complications such as transient introcular pressure rise, retinal detachment, and cystoid macular edema have been reported, it has largely supplanted traditional knife surgery of the posterior capsule (14).

RESULTS

The study includes 73 patients with 109 cataract extractions. 36 of the patients had cataract extractions performed on each eye and 37 had cataract extractions performed on only 1 eye. The patients were selected randomly and their clinical charts were reviewed. The time period of the study dates between January 1984 and January 1989.

Cataract extraction was performed by one surgeon and each patient was seen pre and post-operatively by the same surgeon. Patients were seen post-operatively at a minimum of 1 day, 3 weeks, 6-8 weeks, and 6 months. The patients that were referred by an

optometrist for cataract surgery were sent back to the optometrist's office after seeing the surgeon at the 8 week visit. The optometrists were instructed to notify the surgeon of any ocular complications that were related to the cataract surgery the patient had incurred.

Planned extracapsular cataract extractions (ECCE) with nuclear expression were performed on 41 eyes and phacoemulsification were performed on the remaining 68 eyes. Planned ECCE was performed on all patients requiring cataract surgery prior to 1985. After 1985, only patients with very dense nuclear sclerotic cataracts or severe corneal endothelial decompensation received planned ECCE.

The greatest refractive change post-operatively occured between 6 weeks and 6 months. Patients will usually present with a refractive change of approximately 1.00 diopters shifting towards ATR astigmatism, at the 6 month post-operative examination. Between 6 months and 1 year, the refractive change is approximately 0.50 diopters, once again shifting towards ATR astigmatism. The refractive change was the result of sutures loosening as the wound healed. Also, the refractive change seems to occur equally with both ECCE and phacoemulsification.

Post-operative complications were also studied. Of the 109 cases studied, 1 person developed a hyphema. The hyphema was seen one day post-operative and resolved in 1 week. The patient had open angle glaucoma prior to surgery. Best pre-operative correctd

acuity was 20/80 and best post-operative corrected acuity was 20/30 at 8 weeks.

Cystoid macular edema (CME) was noted in 2 patients (1.8%) post-operatively. Each procedure, ECCE and phacoemulsification, are represented in the cases of CME. In the case of the ECCE procedure, CME developed 7 months post-operative. The patient had had worse than 20/400 acuity prior to surgery. 7 months later, after developing CME, the patient's acuity had decreased to 20/100. Presently, they have 20/400 visual acuity.

The other patient developed CME 9 months post-operative. This patient had a history of background diabetic retinopathy prior to surgery. The acuity dropped form 20/30-20/60 after developing the CME. The patient's visual acuity never improved, in fact, it deteriorated. Proliferative diabetic retinopathy was noted 2 years post-operatively and the patient developed neovascularization on the optic disc along with a vitreal hemorrhage. The current visual acuity of this patient is 20/400. The 2 patients that developed CME were followed but did not receive medications or surgical treatment. The reason being, the current treatment for CME is controversial.

3 (2.7%) patients developed retinal detachments post-operatively. 2 (4.8%) of the 41 patients that developed retinal detachment had received ECCE surgical technique. 1.5% had received phacoemulsification. The time periods post-operatively were 4 months, 8 months, and 10 months. Literature indicated that

retinal detachments most commonly occur at 6 months. One of the patients that developed the detachment was a 7.00 diopter myope prior to surgery and another had a history of background diabetic retinopathy prior to surgery. Scleral buckles were performed on each patient for repair of the detachments.

1 (0.9%) patient developed a retinal hole 3 years post-operatively. The hole developed over and area of lattice that existed prior to surgery. The retinal hole was repaired with the Argon laser. Resultant acuity was 20/20.

24 (22%) of the 109 cases studied developed a secondary membrane of the posterior capsule. Of the 41 patients who had an ECCE, 9 (22%) developed a secondary membrane as did 14 (22%) of the 68 who had phacoemulsification. The average time period for the secondary membrane to develope in the ECCE patients was 2 years. It was 1 year and 7 months for the patients who underwent phacoemulsification.

Patients who developed secondary membranes of the posterior capsule were treated with a Nd:YAG laser. The YAG laser produced an opening in the posterior capsule. The average visual acuity prior to posterior capsulotomy was 20/40. The average visual acuity following the laser procedure was 20/20-20/25.

The criteria for success listed earlier (20/20 to 20/40 with no post-operative complications) occured in 90% of the patients that I

studied. 75% of the patients that participated in the study had 20/20 post-operative acuity at the 8 week visit.

CONCLUSION

With the ever increasing age of the population, there will be many cataract surgeries being performed each year. Many of these patients will see optometrists for pre and post-operative eye care.

Optometrists interested in being involved in pre and post-operative care need to be aware of the normal healing process of the eye following cataract surgery. They must also be able to identify abnormalities and be able to treat them. Cooperation between the optometrist and the ophthalmologist is the best way to provide the patient with quality care, comfort and convenience.

COMPLICATIONS	TIME PERIODS	MANAGEMENT
ASTIGMATISM	6-8 Weeks:	Greater than 1.50 diopters not present pre-operative REFER for suture cut
BULLOUS KERATOPATHY	6 Months to years:	Hyperosmotics or high water content SCL
CAPSULAR CLOUDING	6 Months to years:	REFER to surgeon for YAG laser
CHOROIDAL DETACHMENT	1 Day to 1 week:	REFER to surgeon for retinal consult
CORNEAL EDEMA	1 Day to 1 week: 1 Week to 6-8 weeks:	Monitor IOP REFER to surgeon for corneal consult
CYSTOID MACULAR EDEMA	6 Months to years:	REFER to surgeon for retinal consult
DISPLACED IOL	1 Day to years:	REFER to surgeon for medical or surgical management
ENDOPHTHALMITIS	1 Day to 6 weeks:	REFER IMMEDIATELY for medical management
FOREIGN BODY SENSATION	1 Day to 1 week:	Rule out corneal abrasion and check sutures
HYPHEMA	1 Day to 1 week:	Follow every other day if it does not resolve in 1 week REFER
HYPOTONY	1 Day to 1 week:	REFER
INCREASED IOP	1 Day to 1 week: 1 Day to 1 week: 1 Week:	Greater than 25 initiate TIMOPTIC 0.25% b.i.d. RTC 1 day Greater than 30 initiate DIAMOX 500 mg sequels P.O. RTC 1 day If IOP does not respond to glaucoma medications REFER to surgeon
IRITIS	1 Day to 6-8 weeks:	Controlled prophylactically by antibiotic steroid combination Standard medication is Maxitrol ophthalmic suspension q.i.d.
POSITIVE SEIDEL TEST	1 Day: 1 Week:	Follow every other day and monitor IOP REFER
PTOSIS	1 Day to 1 week: 3 Weeks to years:	Follow Rule out neurology or REFER
PUPILLARY ENTRAPMENT	1 Day to years:	REFER
RETINAL DETACHMENT	6 Months to years:	REFER for retinal consultation

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