Optometry's Expanding Role in the Management of Cataract Patients

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Cataracts are the most prevalent ophthalmic disease and remain the leading cause of blindness in the world totaling over 17 million people (Enoch, et al, 986). In the United States, studies have shown that cataracts are present in 10% of all citizens (Murrill, et al. 1) with the prevalence being 50% in the 65-74 age group and 70% in those 75 and older (Khan, et al. 17-32). With these staggering statistics, and the fact that cataracts are a preventable or curable cause of blindness, one can see the great need for high quality patient care. Because of optometry's expanding scope of practice, optometrists are playing a larger role in diagnosing, referring, and co-managing of the cataract patient.

With this larger role in cataract care and management, the optometrist must be educated in the proper pre and post-operative management of cataracts.

In order to satisfactorily diagnose cataracts and correctly refer these patients, optometrists must have a proper working definition for a cataract. There are many definitions for the term cataract. One definition, which is commonly referred to as the academic definition, describes a cataract as any opacity of the lens. The clinical definition, or the definition that optometrists should follow, states that a cataract is a lenticular opacity or group of opacities sufficient enough to cause visual impairment(Thurscheret, 85). The term visual impairment is defined as: "a decrease in visual function that is subjectively and/or objectively demonstrable" (Cataract Management Panel, 69). This means that not only visual acuity is a factor, but also contrast sensitivity and glare need to be considered. The visual needs and demands of each patient, determined by their activity level, is also an important consideration is the diagnosis of a cataract.

Once a working definition of a cataract is developed, clinicians must be well versed in the types and classifications of cataracts. Cataracts are classified by six different systems or schemes: age of onset, location of the opacity present, the degree of the opacity present, the rate of development, the biomicroscopic appearance, and the etiology(Betts, 9-11).

One system of classifying a cataract is according to age of onset. This can be broken down into two subgroups: congenital (from birth) and acquired which is further classified into infantile, juvenile (early adulthood), adult, and senile or late adulthood onset. Congenital cataracts are generally due to embryonic malformation, traumatic disruption, or other disruptive forces such as viral infection and metabolic errors. Acquired cataracts occur as a result of toxins, systemic diseases, injury, ocular inflammation, and normal aging changes. The senile form makes up a vast majority of the cataracts followed distantly by congenital and then juvenile onset (Betts, 9).

A second system for classifying cataracts is according to the location of the opacity present. The crystalline lens is divided into structural layers. These layers are the anterior capsule, the anterior subcapsule, the anterior cortex, the nucleus, the posterior cortex, followed by the posterior subcapsule and capsule.

Another system of classification is according to the degree of the opacity present. These degrees are: immature, intumescent, mature, hypermature, and morgagnian(these are terms only used to describe the density of a cortical cataract). These opacities are further graded according to density, with the grade (1+) being a mild cataract and (4+) being advanced. A cortical cataract begins as accumulations of extracellular water which disrupts the lens fibers causing opacification. This opacification runs radially or "spoke-like" and usually starts inferior nasally(Betts, 10). In classifying these cataracts, the term immature refers to when scattered opacities are present separated by transparent zones. Intumescent describes when the lens swells with fluid clefts where as a mature cataract is when the entire lens has become opaque. A hypermature cataract occurs when liquefication of opaque lens fibers occur resulting in leakage and shrinkage of the lens. A morgagnian cataract describes when there is a floating hard nucleus within a liquefied cortex.

The fourth system of classification is according to the rate of development. This category divides cataracts into stationary and progressive types.

Cataracts are also categorized on the basis of their biomicroscopic appearance or shape. One of the main morphological types is capsular. Capsular thickening or opacification can occur congenitally or be acquired in pseudoexfoliation syndrome, gold toxicity, glass-blowers' cataract and Vossius's ring. Another main type is the lamellar cataract. This type of cataract is usually congenital in nature and involves one lamella or plate of the fetal nucleus and has spoke-like opacities surrounding the cataract. A third cataract, characterized by shape, is sutural. These types of cataracts form along the area where the growing lens fibers meet and are usually of little visual significance. Another clinically insignificant cataract type is the punctate opacity. These small dot like opacities rarely interfere with vision. Two additional morphologically characterized cataracts include the nuclear opacity, where the entire fetal nucleus is opaque, and the subcapsular cataract which are typically secondary or complicated cataracts but can also be found associated with corticosteroid medication, irradiation, and age-related cataracts(Kanski, 239).

A sixth system to classify cataracts is by etiology. Although it can be very difficult to determine an etiology, Cataracts can be classified as hereditary, traumatic(the most common cause for unilateral cataracts), metabolic, toxic, or rare types associated with specific syndromes. Each cataract can be classified by one or any combination of these categories. But, it is important to initially categorize each cataract by age of onset and then by location and degree.

The optometrist, the primary entry point or gatekeeper of the eyecare system, encounters many patients with the complaint of decreased vision. Many of these patients may not know the cause of their decreased vision, while some, though previous eye examinations, may know that a cataract is the cause. It is the responsibility of the optometrist to detect and diagnose the cause of decreased visual acuity.

The detection of a cataract starts by taking a good case history. After a thorough medical and ocular history is taken, a chief complaint is asked. Complaints voiced by many patients with cataract include: decreased acuity at both distance and near, diplopia or polyopia, glare or light sensitivity, abnormal color vision, and object distortion. Specific questions the optometrist should ask are: "Did this problem come on quickly?; Is this problem worse during the day or nighttime?; Are there ere specific tasks where the problem is worse?; Do you specifically have problems with glare or halos?; and Does the problem affect your everyday activities or lifestyle?"(Murrill, et al 43-44).

Objective testing begins with taking Snellen acuity at both distance and near. With a reduction in acuity, it must be determined whether this acuity loss can be corrected refractively. This can be tested before the formal refraction by using a pinhole with the snellen acuity chart. If acuity improves with pinhole testing, the reduction is most likely secondary to a refractive error change.

In retinoscopy, a cataract can be determined by paying close attention to the brightness of the reflex and by noticing any difference between the two eyes. Significant nuclear sclerosis may be noted appearing as a hazy central reflex. Performed next is the subjective refraction. Refraction is done to obtain the best corrected visual acuity. A myopic shift from the patients habitual prescription is sometimes noticed with nuclear sclerosis due to the change in the index of refraction of the lens. With cortical cataracts, a hyperopic shift can occur.

In patients where cataracts are suspected, binocularity should also be evaluated. A central lens opacity can divide the visual axis resulting in two blurred images and thus monocular diplopia or polyopia. Also, if a cataract is significant enough or occurs early in life, binocularity can be disrupted causing strabismus, amblyopia, or both.

Biomicroscopy or slit lamp evaluation is perhaps the most important procedure in examining a cataract patient. Careful examination must be directed toward the ocular adnexa, cornea, anterior chamber, iris, and lens. Careful evaluation begins with the ocular adnexa. Any adnexal disease or infection present must be treated and resolved before cataract surgery is considered. Detection of any corneal dystrophies or disease is essential in ruling out the cornea as a potential cause of reduced visual acuity. Particular attention must be paid to the corneal endothelium for any defects in its integrity such as corneal guttata and polymegathism. Also, any corneal infection (for example; herpes keratitis) must be "quiet" approximately two or three months prior to surgery(Mogk, interview).

Anterior chamber depth should be examined to determined if there is any narrowing of the anterior chamber secondary to lens intumescence. The anterior chamber should also be examined for any inflammatory reaction to rule out uveitis. Anterior uveitis should be controlled well for several months prior to cataract extraction(Murrill, 46).

The iris is examined for synechia, rubeosis and transillumination defects. These findings indicate an underlying disease process that may need to be addressed prior to surgery.

The crystalline lens is examined with diffuse illumination for opacities encroaching on the visual axis. Judicious attention is required to note if the opacities observed justify the patient's symptoms to rule out any other causes of the visual reduction.

The next procedure that should be performed is tonometry. Intraocular pressure needs to be evaluated to help rule out glaucoma.

Posterior segment examination needs to be performed through a dilated pupil with a binocular indirect ophthalmascope and a biomicroscope with a fundus lens (78D,90D, Hruby lens). With the binocular indirect ophthalmascope, the peripheral fundus is examined for retinal holes, tears, detachments, scars, vitreoretinal adhesions, degenerations, inflammation, or anything that might contribute to vision reduction.

With the biomicroscope and a dilated pupil, it is possible to visualize the entire lens' nucleus, cortex, subcapsule, capsule for opacities, thickening, or swelling. These opacities are examined for size, color, and opaqueness to ascertain whether the cataract is the sole cause of visual loss. The vitreous is also viewable for posterior vitreal detachments and syneresis.

With the biomicroscope and fundus lens, a enlarged view of the posterior pole is achieved to rule out optic nerve inflammation, disease, and glaucomatous changes. The fovea is examined for elevation and/or degeneration to rule out other causes of visual reduction.

But, what happens when the cataract is too dense to achieve a good view of the fundus? Some special techniques have been developed to try to gauge the potential acuity with cataract removal and the prognosis for the cataract surgery. One way to access what the visual function was prior to the maturation of the cataract is through the history of the patient. A patient who can give reliable answers about the onset of the visual reduction along with past visual acuity information and ocular health data provide one piece of information that will aid in establishing a prognosis.

Other methods of determining ocular function are: light perception testing, light projection testing, and the two light discrimination test. These tests give information on gross retinal function, such as visual field defects and retinal integrity. Other tests like the Maddox Rod test and color perception analysis give indications of possible cone dysfunction, while tests that use entopic phenomenon are occasionally used to clinically access gross retinal function. Examples of these are the Purkinje Vascular Tree visualization, the "flying corpuscle" test, and the Maxwell's spot and Haidinger's Brushes which specifically test macular function. These tests, although they provide some information, still leave clinicians wondering whether negative responses on any of these tests should be the sole basis for not recommending surgery(Thurschwell, 120).

Snellen visual acuity is the most common method of assessing visual function. But, in many patients it may not accurately show the actual level of impairment. Contrast sensitivity testing is sometimes used by clinicians to gauge visual function . Contrast sensitivity is a measure of the degree of contrast required to detect a test object(Cataract Management Panel, 48). Contrast sensitivity uses shading variations and determines the eyes ability to detect these variations by presenting letters, figures, or sine wave gratings that vary in contrast, luminance, and spatial frequency. In other words, it examines the eyes ability to see from small to large objects and from high to low contrasts.

Many devices and instruments are available to measure contrast sensitivity. But, studies have shown that contrast sensitivity testing does not differentiate between visual loss due to a cataract and visual loss from other causes(Cataract Management Panel, 51). Therefore, it is not a good indicator for postoperative visual function.

One study on contrast sensitivity in which pre- and postoperative results are compared used the interferometer (Morris, et al. 1991). The interferometer is an instrument that relies on a striped or fringed pattern projected onto the retina(Thurshwell, 174). The size and orientation of the fringed pattern can be varied and the patient responds by indicating the direction of the pattern. The retinal image of the fringes is independent of the eye's refractive error. The laser interferometer has demonstrated good success in predicting postoperative prognosis in patients with entering acuities of better than 20/200(Cataract Management Panel, 51).

Another method of predicting postoperative acuity is the potential acuity meter (PAM). PAM is mounted on the slit lamp and projects an acuity chart in a small beam of light(.10 mm) onto the retina through a dilated pupil(Thurschwell, 172). With the patient's spherical correction in place, the beam of light is projected through a window or less dense portion of the cataractous lens. A well placed chart can probe visual acuity in a range from 20/400 to 20/20(Thurschwell, 172). Studies have indicated that the PAM provides good result in patients with less dense cataracts producing a visual acuity better than 20/200(Moses and Hart, 545-51).

Glare is a common complaint among cataract patients. Some patients can have normal visual acuity but with certain lighting, such as headlights from oncoming cars, glare can cause a substantial decrease in vision. This decrease is secondary to the opacities in the lens causing a scattering of light. This scattering of light can produce a feeling of discomfort or inhibit distinct vision. In testing this disability or discomfort glare, there are many different ways to evaluate a loss in visual function. One test clinicians use is testing visual acuity first with the room lights dimmed and then with high illumination in an effort to detect a drop in acuity. Other clinicians use a pen light and shine it in the patient's eyes from 12" to 18" and at an angle of from 15 to 30 degrees from the temporal side while retesting acuity. Other more sophisticated methods are available to assess glare. One such instrument is the Brightness Acuity Meter (BAT) by Mentor. It is a handheld instrument with an illuminated bowl and a 12 mm aperture. The patient holds the instrument over the eye with the fellow eye occluded. The acuity is rechecked at different light levels.

Glare testing has some associated problems with reproducibility and the fact that glare symptoms are not specific to cataracts. Therefore, glare testing results should not be a sole objective finding to justify cataract extraction(Cataract Management Panel, 56).

There is some debate whether specular microscopy is a necessary procedure prior to cataract surgery. Specular microscopy is a tool used to measure and record corneal endothelial cell counts and evaluate its morphology. The endothelium's role is believed to be the maintenance of normal corneal hydration. Defects in this layer make the cornea more prone to swelling and decompensation. This becomes important in cataract surgery because the cataract extraction can cause a reduction in the endothelial cell count especially with phacoemulsification(Thurschwell, 181). The surgeon may inject a viscoelastic substance such as Healon, Amvisc, and Occocoat to minimize damage to the remaining cells(Thurschwell, 180-81). The viscoelastic substance coats the endothelium, thereby protecting it from phacoemulsification damage.

The debate with specular microscopy is whether routine use actually gives more information than is already known from routine preoperative evaluation. This includes case history and clinical examination with a biomicroscope (Cataract Management Panel, 67).

The B-wave Ultrasonographer is a tool that gives a two dimensional view of the eye's internal structures. It is used in cases where the clinician can not view the ocular interior and wants to rule out retinal detachment, vitreous hemorrhages, tumors , and optic nerve evaluation prior to surgery.

The A-scan Ultrasonographer produces a one dimensional view that measures the eye's axial length and distances between ocular structures. The instrument produces vertical spikes at each tissue interface and measures the distance between each interface. The anterior and posterior cornea, anterior and posterior lens capsule, and vitreoretinal interface all produce spikes. Preoperative A-scan is a standard procedure used to measure the axial length and with the keratometer results is used to calculate the intraocular lens power. This procedure should be done on both eyes to compare results and rule out possible staphyloma or micro-ophthalmia. A difference of less than .2mm is acceptable (Thurschwell, 165).

With all the testing results obtained, the clinician needs to educate the patient regarding prognosis and possible consequences with cataract extraction. The clinician also has a legal duty to warn the patient of the possibility or risk of injury with the visual impairment secondary to the cataract(Classe, 116). For example, a reduction in visual acuity below 20/40 may create impairment in operating a vehicle. The clinician must offer his educated opinion on what the patient should or can do, but, it is important to let the patient decide whether to undergo the surgery given cataract surgery is an elective procedure.

The clinician must discuss with the patient the criteria for surgical referral and the risks and benefits of each possible decision.

The clinician should go over with the patient the criteria used for surgery consultation. Standard criteria include Visual acuity 20/50 or worse, decreased ability to function in everyday life secondary to the cataract, glare disability, a refractive difference between the eyes caused by cataracts, a permanent threat to vision, such as phacolytic glaucoma, and the cataract prevents fundus visualization for treatment of other conditions such as diabetic retinopathy.

Some common contra-indications for surgery are as follows: The patient does not desire surgery, the patient is in poor physical health, glasses provide satisfactory vision, the patient's lifestyle is not compromised by the cataract, the patient is monocular, and the patient has endothelial defects.

The clinician also needs to educate the patient on possible non-surgical management. Some examples of these are: lenses, magnifiers, bifocals, pupil dilation for those with posterior subcapsular cataracts, and a decrease in cataractogenic agents.

Many advances in cataract surgery have come about in the last ten years. Many of these are techniques that help to reduce complications and, therefore, increase the percentage of successful surgeries to the point that cataract surgery is now considered a low-risk procedure. The most important advances have been: the change from intracapsular cataract extraction to extracapsular cataract extraction, phacoemulsification and aspiration over expression of the intact nucleus, the use of posterior intraocular lenses versus anterior chamber intraocular lenses, the placement of the posterior chamber intraocular lenses into the capsular bag rather than ciliary sulcus, the technique of small shelving incisions to the point where no suture is required, flexible intraocular lens haptics and foldable intraocular lenses, and the use of viscoelastic agents to cushion and prevent corneal damage(Patagoris, 81,82).

Those advances have significantly reduced hospital time, recovery duration, and percentages of postoperative complications. With the increasing number of states with therapeutic drug laws for optometrists, more optometrists are managing postoperative cataract patients. Although co-management is not yet widespread, government reimbursement by Medicare now accepts this form of management between the ophthalmologist and optometrist. In order to manage cataract patients, clinicians need to follow a guideline for postoperative care. Suggested examination intervals for care are: 24 hours, 1 week, 3 weeks, 5-6 weeks, and every 4 to 6 months for two years(Johnston, 11).

Postoperative care actually begins preoperatively. The surgeon needs to inform the patient on what he or she should expect to experience. The surgeon needs to inform the patient on activities to avoid and precautions to take. They also need to be informed of signs and symptoms of postoperative complications. They should be told to call the office if they develop a fever, severe pain, nausea, extreme redness, flashing lights, cobwebs, floaters, or a "shade" over a portion of their vision.

The first postoperative examination is scheduled for the day following surgery and the evaluation is as follows:

History:

The patient is asked if she had any problems during the night. They are also asked if they are experiencing any pain or discomfort.

Visual Acuity:

Visual acuity is taken without correction and then again with pinhole. A reduced acuity (20/40 to 20/200) is expected secondary to corneal edema and ointment in the tear film(Swanson, 62). This should resolve over a few days.

External Examination:

Ptosis needs to be evaluated and its presence needs to be followed for resolution. The frequency of early postoperative ptosis is 74.3% the first day but frequently resolves rapidly(Ropo et al, 728).

Mobility:

The eye should move freely to all nine cardinal positions of gaze. Occasionally there can be a decrease in mobility secondary to residual anesthesia.

Refraction:

Is only done in cases of decreased visual acuity beyond that expected from corneal appearance(Johnston, 13).

Biomicroscopy:

Conjunctiva: Evaluate the conjunctiva for edema and injection. Also, evaluate the wound for closure. This is done using the Seidel test. The procedure involves instilling sodium-fluorescein into the eye and watching for a flow of stain from the wound which appears as a "muddy river in a blue lake" because aqueous stains darker than the tear film.

Cornea: Edema and endothelial folds or stria should be examined. Also observe for endothelial defects.

Anterior Chamber: Should be evaluated for cell, flare, hypopyon, or hyphema.

Iris: The iris needs to be evaluated for symmetry, roundness, and reaction. If the pupil is peaked the rule of thumb states that the peak points to the problem area where there may be vitreous strands extending to the wound. The iris may also have small irregularities due to phaco touch.

Anterior Chamber I.O.L.: Should be evaluated for displacement.

Posterior capsule: Evaluate for clarity.

Tonometry:

Tonometry is mandatory in each postoperative examination. Low intraocular pressure indicates possible wound leak, retinal detachment, choroidal detachment, iritis, perforated globe, or cyclodialysis(Johnston, 16). Elevated pressure points to potential glaucoma and/or excessive inflammation.

Ophthalmoscopy:

A view of the posterior pole is done to rule out cystoid macular edema and retinal detachment. Dilated view is usually not done at the 24 hour exam unless warranted by other findings. Anything found in this examination contrary to the normal should be reported to the surgeon.

With respect to medication, patients are usually given a steriod and antibiotic or a combination of them to use daily for one to two weeks. The standard of care suggests a topical antibiotic and steroid or combination there of used approximately for two weeks. The patient is also to avoid rigorous activities and instructed to wear eye protection such as a fox shield to bed and depending on the individual surgeon possibly full time(Swanson, 65).

Common pharmaceutical management of the post-op patient consists of: antibiotic therapy which usually involves a combination drop (with steroid) such as: Poly

Pred, Pred-G, Maxitrol, Tobra Dex, and Blephamide among others. Individual drug use varies between clinicians. Occasionally oral antibiotics are also prescribed in the early postoperative period. Examples of these are: Cefaclor, Cephalexin, Dicloxicillin, Doxycycline, Erythromycin, and Tetracycline (Hunter, et al. 4). Occasionally, sensitivity to the aminoglycosides such as gentamycin and neomycin occurs. If this happens, the medication is discontinued and antibiotic from a different drug category is chosen.

As long as recovery is proceeding as expected, the spectacle prescription can be given at the 5 to 6 week follow up examination because at that time the refraction usually stabilizes.

If the surgeon with whom you work is very skilled, the clinician may have an easy time managing post-cataract extraction patients. However, even though cataract surgery is a relatively low-risk procedure, complications can and do occur. Some common complications which optometrists need to be familiar with are as follows:

Ptosis: This is a common finding post-operatively. As previously mentioned, 74% of all patients have some degree of ptosis. This is usually secondary to local (retro or peri-bulbar) anesthesia, forceps trauma, or bridal suture traction and should start resolving within 48 hours without treatment (Bumgarner, 85). Ptosis can also be secondary to intraocular edema.

Ecchymosis: Also a common finding secondary to anesthesia. This blood leakage into the lid tissue usually resolves without treatment in one to three weeks.

Conjunctival hemorrhage: Occurs from bleeding episcleral or conjunctival vessels. More than half of post-operative patients have some degree of subconjunctival hemorrhage, which usually resolves within one to three weeks (Bumgarner, 85).

Wound leak: Non-closure, a failed suture, and blunt trauma can cause aqueous expression through the incision site. This is important because it puts the patient at risk for infectious endophthalmitis, iris prolapse, decreased intraocular pressure, and choroidal detachment. This is tested by performing the Seidel test, as previously explained. Possible management consists of pressure patching the eye, except in cases where there is a gape. If the wound is agape, a referral to the surgeon is indicated for possible suturing of the wound. Topical antibiotics are added, such as ciprofloxacin (0.3%), and the patient also continues on oral antibiotics, such as cephalexin (Keflex), until the wound seals (Murrill, et al. 162).

Corneal edema: Edema is usually present post-surgically secondary to endothelial compromise. It usually resolves within days in all but the most severe cases. In severe cases, management involves installation of topical steroids, anti-glaucoma medications to lower IOP, and lubricating drops for comfort (Bumgarner, et al. 86).

Astigmatism: Less and less often is cataract extraction causing induced astigmatism. With the smaller incision and subsequent decrease in the number of stitches, the less the change in corneal curvature. With superior incisions, with-the-rule astigmatism was commonly induced.

Bullous keratopathy: This is a late complication usually associated with anterior chamber IOL's rubbing against the corneal endothelium. The endothelial cells become compromised and decrease corneal dehydration. Patches of edema form which move toward the surface of the cornea and burst, exposing nerves resulting in pain. Other than pain, patient symptoms may include fluctuating vision, reduced acuity, and glare.

Treatment of bullous keratopathy includes topical hyperosmotics, bandage contact lenses, and, under extreme circumstances, keratoplasty and removal of the anterior chamber IOL's. In the United States, bullous keratopathy secondary to pseudophakia is the most frequent cause of penetrating keratoplasty (Murrill, et al. 202).

Hyphema: Hyphema presents as a layer of red blood cells in the anterior chamber, with floating red blood cells also in the aqueous. Highest incidence of hyphemas occurs in those patients taking anticoagulants such as warfarin (Murrill, et al. 16 6). Incisional hyphema will present on the first day or within the first week, depending upon the degree of blood infusion.

Acute hyphema management consists of watching and waiting with resolution or resorption usually occurring within days. Also, the patient is asked to limit their activities for several days. In more severe cases with a subsequent IOP elevation, surgical intervention may be needed to evacuate the hyphema from the anterior chamber.

Hypopyon: Hypoyon is a rather rare complication that indicates a severe inflammation of the anterior uveal structures. This should be treated as an endophthalmitis until proven otherwise. The surgeon should be contacted immediately and the patient referred for possible anterior chamber tap.

Endophthalmitis: This is a result of the invasion of microbes into the eye either during surgery or in the post-operative period. Acute endophthalmitis is usually accompanied by six signs: conjunctival chemosis, conjunctival injection, hypopyon, blurred vision, debilitating pain, and lid edema with redness (Bumgarner, 87). Visual prognosis is poor following resolution of infection (Swanson, 62).

Treatment of endophthalmitis begins by having an anterior chamber or vitreous tap for culture purposes. The patient is given intravitreal, subconjunctival, and topical antibiotics. A vitrectomy may also be performed (Murrill, et al. 142). Prompt referrals are mandatory because ultimate visual prognosis depends greatly on timely diagnosis and causative organism (Murrill, et al. 142-43). Post-operative endophthalmitis is one of the most common causes of enucleation (Swanson, 67).

Increased intraocular pressure: Many patients exhibit an increase in IOP post-surgically. Typical management suggests simply monitoring pressure that is 25 mm Hg or less in the non-glaucomatous patient(Bumgarner, 92). An early increase in pressure can be due to use and possible retention of a viscoelastic substance or secondary to inflammation. Later increases in intraocular pressure may be caused by a response to topical steroid use(Steuhl, et al. 233). Pressures higher than 25 mm Hg can be managed with appropriate anti-glaucomatous agent.

Iris prolapse: This is when the iris is drawn into the wound gap, or through the wound gap in complete prolapse. Signs and symptoms consist of a peaked pupil, inflamed eye, and a sudden pain. It is important to evaluate the conjunctiva for coverage of the prolapsed iris. If the wound is left uncovered endophthalmitis can occur.

With complete prolapse, treatment involves surgery to repair the wound and return the iris to its normal position. For an incomplete prolapse, treatment can begin with steroids first and surgery if necessary. Also, photocoagulation, cryotherapy , and cautery can be done to cause iris atrophy and allow wound closure(Murrill, 143-145).

IOL Displacement: Although most IOL's are centered to within 1 mm(Swanson, 76), four types of malpositioning syndromes of posterior chamber IOL's can be identified. Pupillary capture occurs when an IOL haptic catches the iris and causes a mishapen pupil. Decentration is common and poses little problem until part of the IOL is within the visual axis and part is out causing two different images focused on the retina. Treatment of this condition involves repositioning the lens. "Windshield Wiper" syndrome is a rare complication that occurs when an IOL is too small for the capsular bag and rotates. Treatment for this is to sew the lens in place with a suture. Sunset syndrome is a serious complication which is encountered early post-surgically . Inferior zonules are ruptured causing the lens to sink interiorly like the sun setting. Treatment of this condition involves rotating the IOL's haptics into a horizontal position and suturing the lens in place or removing the lens and putting an anterior chamber IOL in place.

Vitreous prolapse or touch: This occurs when the vitreous protrudes forward into the anterior chamber and possibly adheres to the corneal endothelium. It occurs rarely with extra-capsular cataract extraction or phacoemulsification. When this occurs, corneal endothelium decompensation results and bullous keratopathy can transpire. Anterior vitrectomy is indicated with prolonged touch.

Cystoid Macular Edema (CME): (also known as Irvine-Gass syndrome when associated with cataract extraction) By definition, CME is a collection of extracellular fluid from the parafoveal capillaries. The fluid accumulates in the outer plexiform layer and can reduce acuity from a range of 20/200 to 20/25. Clinical CME occurs in 3 to 5% of ECCE cases (Murrill, 216-218) and usually presents between one and three months postoperatively(Bumgarner, 91). Subclinical or angiographic CME occurs in 40-50% of all patients following cataract surgery (Betts, 9-13). Retinal signs can be quite subtle and should be examined with a biomicroscope and fundus contact lens. CME should be suspected with an unexpected decrease in acuity with a "good looking" eye. Fluorescein angiography can be used to confirm the diagnosis producing a flower-petal pattern of hyperflourescence at the fovea.

Postoperative CME usually resolves on its own, with resultant visual acuity recovering to 20/40 in 80% of eyes(Patagoris, 104-105). Medical therapy consists of topical, periocular, or oral steroids to decrease inflammation. Nonsteroidal anti-inflammatory agents given topically or orally also may aid in the resolvement of CME by preventing prostaglandin synthesis(Patagoris, 105). Neodydium YAG laser anterior vitreolysis has been beneficial on CME associated with vitreous wound adherence.

<u>Retinal Detachment:</u> A retinal detachment is an elevation caused by the separation of the retina from the retinal pigmented epithelium. Retinal detachment postoperatively often results from pre-existing retinal weakness such as high myopia, holes, tears, or lattice degenerations and sometimes surgical trauma. Retinal detachments commonly occur within 6 months from surgery. The incidence of retinal detachment is around 1.3% of all eyes(Patagoris, 106-107). The patient will usually present with a loss of vision, sudden onset of flashing lights, floaters, or a shadow over the vision. Treatment involves immediate referral to a vitreoretinal surgeon. Patients should also be advised to limit their activity and curb eating in preparation for timely surgery.

<u>Choroidal Detachment:</u> A choroidal detachment is a separation of the retina and choroid from the sclera caused by effusion of aqueous into the suprachoroidal space. This can occur early or late in the postoperative period. Etiology ranges from bloody transudate in the suprachoroidal space secondary to the increased orbital venous pressure (Hemorrhagic choroidal detachment); to decreased intraocular pressure allowing choroidal vessels to leak exudative fluid into the

suprachoroidal space; to intraoperative choriodal effusion when IOP is lowered to zero during surgery causing a pressure gradient (Murrill, 179-181).

Treatment depends upon classification. Small choroidal detachments are usually self limiting. With large detachments, mydriatics and topical steroids are used. Surgical drainage may be necessary through a sclerotomy if lens/cornea touch occurs, Choroidal detachments touch each other for more than 48 hours, there is a failed bleb, or the detachment is pushing against the IOL causing pupillary block glaucoma(Murrill, 179-181).

Posterior Capsular Opacification: This is secondary to proliferation and migration of lens epithelial cells post extra-capsular cataract extraction. This is the most common complication following ECCE, occurring in roughly 50% of all eyes within 5 years(Patagoris, 101-102). Thickenings of these opacities can occur creating round pearl-like opacities called Elschnig's pearls. These opacities become significant when they form on the visual axis and decrease visual function causing the patient to feel like they are developing a second cataract.

Treatment involves the use of the Neodydium YAG laser. Nd: YAG laser capsulotomy involves sending short pulses of energy which break the capsule creating an opening in the visual axis. Complications can occur following this procedure such as: CME, retinal detachment, and IOP spikes.

Topical 1% Aproclonodine is utilized in conjunction with the laser procedure to prevent spikes in intraocular pressure.

Cataract management is one area that is being integrated into optometry's ring of primary care. As optometrists we need to strive to educate our profession for the expanding scope of practice we have sought through legislation.

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