

PSS NEWS

An On-Line Publication for COPE Continuing Education in Optometry

An Optometrist's Guide to Cataract Surgery

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Learning Objectives:

1. To discuss the essentials of cataract surgery
2. To discuss options in IOLS for patients undergoing cataract surgery
3. To review post operative management including common complications

It is estimated that there are nearly 30 million people with cataracts. Of that number, roughly 3 million will undergo cataract surgery. This procedure has evolved greatly in the past several decades. It originally started out as an inpatient procedure which required days in the hospital with sand bags attached to a patient's head so they would move. It has not evolved into a 10 to 15 minute outpatient procedures which is commonly done at a surgical center. As primary eyecare providers, it is our responsibility to understand the essentials of this common surgical procedure. This article will provide an overview on cataract surgery for optometrists.

Prior to the Surgery

An optometrist's responsibility when presented with a patient with a cataract is to conduct a thorough examination so he or she can counsel the patient on the viable options. This examination starts with the patient history. All pertinent medical and ocular history should be considered when deciding if a patient is a suitable candidate for surgery or not. Additionally, a complete review of

systems is necessary in order to assure the current physical status. This should include medical history, pharmaceutical therapy, family ocular history as well as allergy status and prior surgical history.

After that is done, the various components of a comprehensive examination should be performed.

1. Best Corrected Visual Acuity- A manifest refraction is the bare minimum to properly assess what level of patient's vision loss is due to refractive error. Once this happens, several scenarios present themselves when deciding if a patient should be sent for a cataract surgery evaluation. First, some states and/or insurance companies have specific guidelines as to when they allow a patient to undergo cataract surgery. You should take the time to learn what that level is your state to avoid issues later. Next, there is much variability in what level of vision is appropriate to send patients for surgery. Some patients are 20/50 and not have any problems while others may be 20/30 and

are extremely unhappy with their vision. The question I always pose to patients is “How unhappy are you with your vision and what are you willing to do about it?” Lastly, the patient’s performance in an optimal setting is not always indicative of their visual dysfunction in real life situations. For this reason, many optometrists will also assess the patient performance in ways that directly relate to their systematic complaints – for example glare testing or subjective patient complaints of difficulty with night time driving.

2. External examination- The external examination of the cataract patient gives the optometrist a way to assess the overall health of the eye to make sure there are no issues in addition to the cataracts. In particular, pupillary evaluation, confrontation fields, and extra ocular muscle assessment provide important information in the overall examination process. These techniques are typically a part of a comprehensive ocular health examination. In the case of a patient with a cataract, it will allow the optometrist to rule out other ocular pathology that may create post operative concerns if not identified.

3. Slit Lamp Examination. First, there is the status of the eyelids. Since most patients undergoing cataract extraction are generally older, it is not uncommon for them to have conditions such as dermatochalasis, lid ptosis, entropion, etc. These should be noted and evaluated to see if they will pose a problem for the surgeon. In addition, if the patient suffers from dry eyes or blepharitis, these conditions should be managed aggressively to minimize their impact on the surgical outcome. The lens should be reviewed for the status of opacities that are present and the type of cataract - cortical, nuclear and sub capsular.

4. Dilated Fundus Examination- A dilated fundus examination is the bare minimum requirement for a cataract evaluation. It allows the optometrist to assess the health of the retina to rule out other possible causes of decreased vision. The use of hand-held lenses, such as a 90D, 78D or 60D are extremely helpful in bypassing lenticular opacities to obtain views of the posterior pole. Any concerns of macular degeneration, macular holes, macular edema, choroidal neovascularization and vitreoretinal disease should be evaluated carefully before sending a patient for a surgical consult. In some cases, this may involve OCT and or visual field testing. The chief goal is to rule out other possible causes of decreased vision.

Once all of this is done, the most important part of the examination involves talking to the patient about his/her goals for surgery. As their primary eye care providers, we are in a perfect position to suggest options in IOLs and optimal post op refraction. Obviously, the referring surgeon will have this discussion with the patient as well but the optometrist should have the discussion first. This will ultimately facilitate the process. By reviewing the patient’s options, the patient will have the time to think about the options and discuss with others if desired prior to the surgical consult. That way, when the surgeon addresses them again, the patient will be able to make a more informed choice because they will have had time between your visit and that of the surgeon to process all of the options. This discussion should include an overview of the procedures, a schedule of post op visits, especially if the optometrist is co-managing in the post op care. Some states may require written documentation on the part of the patient acknowledging their desire to participate in this process.

IOL Options

The options for cataract surgery are very similar to the options for contact lenses; there is spherical, toric, and multifocal. Let's discuss each briefly.

1. Spherical IOLs. These are the traditional IOLs which offer no astigmatic or presbyopic correction. For patients with little or no astigmatism, they are the easy choice. What makes the choice easier is that this type of IOL is typically the one which is best covered by a patient's medical insurance. With this type of IOL, the patient will have several refractive choices. The first is to get fully corrected for distance in both eyes. This option will provide the patient with the crispest vision for distance but require the patient to use eyeglasses for any near tasks. Another option here is monovision. Just like contact lenses, the surgeon can undercorrect the non dominant eye by 1.5 D or so which will make the patient less dependent on eyeglasses for near work. The last option, is for the patient to remain near sighted after the procedure. This is a good option for patients who had pre-operative refractive errors of -1.50D to -2.50D. These patients have typically spent years taking their eyeglasses off to read and find that preferable to being Plano for distance.
2. Toric IOLs. There was a time that the only way to correct astigmatism during cataract surgery was through limbal relaxing incisions, laser surgery, or wound placement. That is no longer the case. If your patient has a desire to reduce his/her dependency on eyeglasses after cataract surgery these might be a viable option. If your patient decides on this option, the "extra" charge for the premium IOL is typically something that a medical insurance will not cover. Fees vary but can range from \$2000 to \$3000 per eye for out of pocket expenses. Please be aware that these toric IOLs only work for a patients with regular astigmatism. Patients with astigmatism caused by conditions such as keratoconus are poor candidates.

3. Multifocal IOLs. If your patient is interested in decreasing his or her dependency on reading glasses after cataract surgery and is not interested in monovision, today's multifocal IOLs are a valid option. From my experience, I have found several factors to help me determine which patients are good candidates for these types of premium IOLs. The first and most important is patient personality. These IOLs are not for the Type A personality patients who want clear and crisp vision at all distances. The optics on the multifocal IOLs are similar to the optics on multifocal contact lenses. The vast majority of them are based on concentric optic zones which decreases the sharpness of vision. The other option is that there are a few designs which feature accommodating technology similar to what the natural lens of the eye offers. What I tell my patients is that they must be willing to accept an IOL which will work 80% of the time for them. 20% of the time, they may need eyeglasses. In addition to personality, the factors which I find for successful outcomes are patients with normal sized pupils, patients who have no other ocular pathology to decrease possible best corrected vision, and patients who are going to undergo cataract surgery in both eyes in a short amount of time. Patients who have asymmetric cataracts where the second eye will not be done for months or years tend to be poor candidates. The last criteria is patients who are willing to pay the out of pocket expenses, which typically range from \$4000 to \$6000. Once again, most medical insurances consider these premium IOLs to be elective.

Pre-op With The Surgeon

So what happens when you send your patient to the surgeon? The surgeon will perform a dilated comprehensive exam (even though you already performed one). In addition, the patient will have a keratometry

reading and A-scan to measure the axial length. This procedure is a critical element of the preoperative assessment if the patient is to have a successful refractive outcome. These two measurements will allow the surgeon to select an intraocular lens power that will be consistent with the intended final refractive error. In most cases, several Axial length measurements will be taken and the average used. In order to assure the highest level of accuracy, it is generally preferred that all 5 A-scan readings/eye be within 0.3 millimeters to allow for optimal calculation of intraocular lens power. Once this information is obtained, the numbers will be programmed into an IOL Master machine or equivalent and the surgeon will use one of the nomograms (e.g. SRK or Binkhorst, etc)to calculate the final selection of intraocular lens power. If these measurements are done properly, this predicted refractive outcome can be as precise as performing LASIK on a patient.

Once everything is decided, the patient will be told to schedule a visit with their primary care physician who will give his/her approval that the patient is safe to undergo the cataract surgery procedure.

The Procedure

The intraoperative process varies among surgeons and facilities but this is a general overview of what your patient can expect. In many cases, the patient will start instilling antibiotic eyedrops prior to the surgery itself. The patient will also be given bottles or a prescription for the entire post op regimen. In most cases, this will consist of antibiotic eye drops, a topical NSAID, topical steroids, an eye shield, and post surgery sunglasses. The patient may be at the facility 2-3 hours, but the procedure itself typically takes 10-15 minutes of actual surgery time. For those optometrists who are co-managing and handling some of the post op care, I would highly recommend that they spend a day in the operating room with the cataract surgeon to fully appreciate the procedure itself. In most cases, the patient is awake during the

procedure which typically involves local anesthesia. Once the patient is recovered, the patient will be sent home with a shield and patch on the operated eye. In the overwhelming percentage of cases, only one eye is done at a time. The patient will be instructed on the schedule of eyedrops which will be taken for the following 3-4 weeks. In addition, the patient will continue to wear the eye shield at night for up to a week after the surgery and the patient will be instructed not to engage in any heavy exercise or lifting for the week after surgery.

Post Operative Care

Although there is some variability, the typical post op routine is 3 visits – day one after cataract surgery, one week after surgery, and then 4-6 weeks after cataract surgery. One important scheduling issue is who sees the patient on day one after cataract surgery. Unfortunately, there is no set rule for this. It all depends on your level of comfort and that of your surgeon. If your surgeon prefers to see the patient for the one day post op, then you can start seeing patients at the one week visit.

The first day post typically is checking for gross complications. It is typical that the first day visit will range from 20/20 to 20/40 uncorrected in the majority of patients and the pinhole acuity will range from 20/20 to 20/30. Although that is typical, do not be alarmed if the vision is worse than this. There can be many reasonable explanations for this including, but not limited to, the density of the nuclear material, prolonged phaco time, increased intra operative time or pre existent clinical conditions that pre dispose towards increased inflammatory response. The medical history of the one day post op visit should focus on how the patient did after he/she went home. For example, you can ask them about pain, photophobia, discomfort or visual dysfunction. You can also make sure they are taking the proper eyedrops and at the correct intervals.

The major components of this exam will be a quick visual acuity and a detailed slit lamp exam. Findings to watch out for are microcystic edema, corneal striae, cell and flare and integrity of the wound. Additionally, the slit lamp examination should evaluate the position and shape of the pupil as well as the location and stability of the IOL. IOP measurements should be performed with a Goldmann tonometer to check for IOP spikes following the procedure. At the same time while the NaFl dye is present on the eye the optometrist can assess the wound for a Seidel sign. This is evidenced by a leakage of aqueous from the wound and the changing of the color of the dye from the typical green to a green blue. One additional component of the non-complicated post operative visit is to observe the status of the fundus with either a direct ophthalmoscope or a 78/90 D lens. In most cases, the patient's pupil will still be dilated at this visit which will make fundus examination easier.

In the vast majority of cases, this one day post op visit goes fairly smoothly. If that is the case, the patient should be scheduled for a one week post op visit and be reminded to continue with the eye drop schedule. In most cases, the final refraction will be given at the third post operative visit which is typically 4 to 6 weeks after the surgery. By then, most inflammation has resolved and the patient is done with their eyedrops.

Post Operative Complications

Most serious post operative complications are rare. However, even when some of the less serious ones occur, you have two basic options: handle it yourself or send back to the surgeon. Let's discuss a few of these.

Reduced Visual Acuity- This is fairly common following cataract surgery. The majority are benign or transient and will resolve over the post operative course (2-4 weeks) Common causes include uncorrected refractive error (identifiable with pinhole acuity assessment), corneal edema or clinically significant inflammations. The reason for this can be that

the level of energy used during the cataract extraction was greater than typical. If refractive error, the key to proper management is to encourage patience, as a refraction is typically not done until 4-6 weeks later. If due to corneal edema/inflammation, make sure the patient is compliant with the topical NSAIDs and topical steroids. In the vast majority of cases, it will resolve over time.

Wound Leak

This does not happen too frequently, but it does happen. The simple reason is that, in the vast majority of cases, surgeons don't use stitches anymore. Because they typically use foldable IOLs, the incision is much smaller and it left to self-seal. In the vast majority of patients, this happens without a problem. However, every now and then, you will encounter a situation where it doesn't. Clinical signs will be reduced IOP and positive Seidel's sign. My recommendations for the management of these patients are as follows. If the wound leak is small, you can monitor a patient. See the patient for a follow up in 24 hours to make sure that it has sealed. If the wound is a little larger you can place a bandage contact lens and then see the patient back for follow up in 24 hours. This will take care of 90 to 95 % of patients with a wound leak. If you are worried because the wound leak seems rather large, send the patient back to surgeon for consideration of a stitch.

Increased IOP. This is a fairly common as well. Why does it happen? There are two principle reasons. The first is the use of a viscoelastic substance during the procedure itself (to keep the anterior chamber open). In some cases, this viscoelastic substance remains in the eye which can increase IOP. This is the most common cause for IOP spikes at the one day post op since they are not related to steroid response (the patient will have only been using the steroid eyedrops for one day at that point). The second reason why it happens is that the patient is having a response to the topical steroids used post operatively. These IOP spikes might manifest

at the second or third post op visit. Solutions for this IOP spike depend on how elevated the IOP is. Mild IOP spikes may be monitored without any intervention. Moderate IOP spikes can be reduced with the use of topical IOP lowering agents such as brimonidine or topical beta-blockers. In this case, be sure to avoid the Prostaglandins. If the IOP is still high or the patient is experiencing a dramatic IOP spike, once can prescribe oral Diamox (acetazolamide). In such cases, be sure to double a check the patient's medical history to rule out any contraindications. If you do prescribe Diamox, be sure to prescribe the 250 mg tablets instead of the sequels, as you want a dramatic decrease in IOP rather than the sustained release the sequels provide.

Cystoid macular edema- This will happen most commonly in your diabetic patients but can also happen randomly in others. We don't know the precise reason why it does happen, but some believe that the mechanism involves a chemical stimulus to the sensory retina due to increased inflammation following cataract surgery. Clinical presentation will be unexplained decreased vision in the involved eye. Fundus examination with a 78 or 90D lens may or may show this edema. If CME is suspected, I recommend a macular OCT done on the patient. This will not only confirm the diagnosis, but it was also provide a baseline so you can repeat the OCT when the patient's vision has returned to normal to confirmed total resolution.

Treatment of CME involves increased doses of prednisolone acetate and topical NSAIDS. The vast majority of post surgical patients will respond to topical therapy and eventually achieve a normal visual outcome.

Endophthalmitis: With the advances in surgical techniques and the use of pre and post op antibiotics, the incidence of this potentially sight threatening complication is exceedingly rare. The clinical presentation varies from patient to patient but includes pain, photophobia, increased injection and

decreased acuity. In most instances the onset will be within 24-48 hours after surgery but some cases can present as late as 5-8 days after the procedure.

Treatment should be immediate and involves the notification of the surgeon and the referral of the patient to a vitreo-retinal specialist for aggressive treatment. Although it is a rare complication, early recognition and immediate referral by the optometrist is critical to the overall success and final visual outcome.

Assuming none of the above complications, the final post operative visit takes place roughly 4 to 6 weeks after the surgery. By now, the patient will have finished most or all of the post operative eye drops. This is the visit that most patients look forward to because it is the visit at which they will be given a new prescription for eyeglasses to help optimize their vision.

Following the normal post-operative care schedule, most eyecare providers like for the patient to return for follow up at 3 months to assess visual function and overall success of the procedure. Assuming everything is normal at that visit, the patient will likely be put on a yearly schedule for ocular health examinations.

As primary care optometrists, we are all fully capable of managing the care of the post-operative cataract patient. It starts before the patient is referred to the surgeon and ends with a patient ultimately being returned to us for long term, continued care.

CONTINUING EDUCATION QUIZ

This article is worth two (2.0) continuing education credits. This COPE-approved program is accredited by the University of Alabama at Birmingham College of Optometry.

Once you have registered for the course, you will be given an access code and go to www.flexiquiz.com where you will take the quiz. To earn credit, you must receive a grade of 70% or greater.

Please note that all 50 states have different rules and regulations concerning the acceptance of correspondence/internet continuing education. Please verify with your state board of optometry as to the amount of allowable hours and acceptable categories/topics in your particular state.

Continuing Education Quiz

1. According to the information presented, roughly how many cataract surgery procedures are performed in a year?
 - a. 1 million
 - b. 2 million
 - c. 3 million
 - d. 4 million
2. According to the information presented, approximately how long does the cataract surgery procedure typically take?
 - a. 10 to 15 seconds
 - b. 10 to 15 minutes
 - c. 10 to 15 hours
 - d. 10 to 15 days
3. What level of vision should be before sending a patient out for a cataract surgery evaluation?
 - a. 20/20
 - b. 20/40
 - c. 20/80
 - d. There is no magic number. It should be based on a patient's needs and how much their vision is interfering with their daily life activities.
4. When evaluating a patient's fundus to rule out other pathologies causing a decrease in vision, what is the author's recommended if macular edema or other disease is suspected?
 - a. Order an OCT
 - b. Order a corneal topography
 - c. Order a keratometry
 - d. Measure corneal thickness
5. What is the chief advantage of spherical IOLS corrected fully for distance for a patient with little or no astigmatism?
 - a. The patient will be able to read a newspaper with no glasses
 - b. The patient will have the crispest vision for distance

- c. The patient will have the crispest vision for near work
 - d. There is no advantage
6. What is the chief disadvantage of spherical IOLS corrected fully for distance for a patient with little or no astigmatism?
- a. The patient will not be able to drive with no glasses
 - b. The patient will have the crispest vision for distance
 - c. The patient will need a prescription for glasses for near work
 - d. There is no advantage
7. Which group of patients does the author NOT recommend toric IOLs for?
- a. Patients with presbyopia
 - b. Patients with astigmatism
 - c. Patients with myopia in addition to the astigmatism
 - d. Patients with keratoconus
8. According to the information presented, what is the most important criteria for patient selection when deciding if the patient is a good candidate for multifocal IOLs?
- a. Patient personality
 - b. Patient age
 - c. Patient sex
 - d. The status of the cataract
9. Which one of the following is NOT a significant factor in determining if multifocal IOL are appropriate for a patient?
- a. Patient's previous refractive status
 - b. Pupil size
 - c. Status of cataract in fellow eye
 - d. Any other ocular conditions potentially decreasing a patient's vision
10. What is the main purpose in measuring keratometry and axial length in patients scheduled for cataract surgery?
- a. To insert the values into a nomogram to help the surgeon decide what power of IOL to use during the procedure
 - b. To rule out diseases such as keratoconus
 - c. To determine if a patient has glaucoma
 - d. To determine if a patient has dry eyes
11. According the author, which of the patients would be most likely to want a post operative refractive error around -2.00 D
- a. Patients who have significant astigmatism
 - b. Patients who were previously hyperopic
 - c. Patients who are interested in multifocal IOLs
 - d. Patients who were previously 1.50D to 2.50 D myopic
12. Which one of the following is NOT a typical eyedrop used post operatively after cataract surgery?
- a. Topical antibiotics
 - b. Topical antivirals
 - c. Topical NSAIDs

- d. Topical Steroids
13. According to the information presented, for roughly how long after cataract surgery should a patient wear the eye shield and refrain from heavy exercise?
- 1 hour
 - 1 day
 - 1 week
 - 1 month
14. Which one of the following is typically not a scheduled post operative visit following cataract surgery?
- 3 hours
 - 1 day
 - 1 week
 - 4 to 6 weeks
15. What is the suggested management strategy for a patient who demonstrates a small wound leak?
- Follow up in 24 hours or a bandage contact lens
 - Send to retinal specialist immediately
 - Increase dosing of topical steroids
 - Have the patient repeat the cataract surgery procedure
16. What is the suggested management strategy for a patient who demonstrates a large wound leak?
- Follow up in 24 hours or a bandage contact lens
 - Send back to surgeon for possible stitch placement
 - Increase dosing of topical steroids
 - Have the patient repeat the cataract surgery procedure
17. Which of the following is a common reason for IOP spikes at the one day post op visit?
- Patient had uncontrolled undiagnosed glaucoma
 - Patient is a steroid responder
 - Presence of viscoelastic substance
 - Patient has endophthalmitis
18. Which of the following is a common reason for IOP spikes at the 4-6 week post op visit?
- Patient had uncontrolled undiagnosed glaucoma
 - Patient is a steroid responder
 - Presence of viscoelastic substance
 - Patient has endophthalmitis
19. Which diagnostic tool is most valuable to help confirm if you suspect cystoid macular edema during the post op period?
- Keratometry
 - Ascan
 - Corneal topography
 - OCT of the macula
20. What the suggested management for a patient with cystoid macular edema during the post op period?

- a. Increasing dosing of topical steroids and/or topical NSAIDs
- b. Adding topical antibiotics
- c. Adding aggressive lubrication to the post op regimen
- d. Instilling punctal plugs