

Co-management of Cataract Surgery

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Cataracts

- Each year about 2.8 million cataract operations are performed, making it the most common operation in the U.S. for people over age 65.

Appropriateness

- “Primary indication for surgery is when visual function no longer meets the patients needs and for which cataract surgery provides a reasonable likelihood of improvement or when lens opacity inhibits optimal management of posterior segment disease or the lens is causing inflammation or unmanageable glaucoma”

• American Academy of Ophthalmology

Pre Operative Orders

Begin 4-7 days before surgery:

- Topical Antibiotic
- Topical NSAI
- Lid Hygiene

Systemic Health Considerations

- Clearance by PCP required
- Full eval including EKG must be within 30 days of procedure

- Some surgeons no longer require routine preoperative medical testing

The Value of Routine Preoperative Medical Testing before Cataract Surgery: Oliver D. Schein, M.D., M.P.H., Joanne Katz, Sc.D., Eric B. Bass, M.D., M.P.H., James M. Tielsch, Ph.D., Lisa H. Lubomski, Ph.D., Marc A. Feldman, M.D., M.P.H., Brent G. Petty, M.D., and Earl P. Steinberg, M.D., M.P.P. for the Study of Medical Testing for Cataract Surgery: N Engl J Med 2000; 342:168-175 January 20, 2000

Cataract Surgery

- Unilateral
 - 2nd eye usually done 1-4 weeks after 1st eye

- Performed in hospital or Ambulatory Surgical Center (ASC)

Cataract Surgery Preparation

- Contact Lens Removal
- D/C RGP 1 to ? Months..check stability
- Helpful to change patient to soft lens if considering referral within 6 months
- D/C soft lens....1-2 weeks ...surgeon dependent

Pre-op Medications

Topical NSAID

Topical Antibiotic

Lid hygiene

Pre-operative Testing

- Uncorrected and Best Corrected VA (monocular and binocular)
- Pinhole VA
- Binocular Status
- EOM's
- Pupils
- Manifest Refraction
- Cycloplegic Refraction
- Slit lamp Biomicroscopy
- Tonometry
- Dilated retinal exam
- Manual Keratometry
- Topography
- Tomography
- IOL Master – A-scan
- OCT*

Informed Consent

- Risks
- Benefits
- Alternatives
- Medications
- Standard Orders
- When to Make Changes

RISKS

- Blindness
- Endophthalmitis
- Retinal Detachment
- Corneal Decompensation
- CME
- Refractive Surprise
- Dryness
- NVD's/Dysphotopsia
- Secondary Cataract

Surgery

- Anesthesia
 - Topical (tetracaine, proparacaine, lidocaine)
 - Advantage – low complication
 - Disadvantage – no EOM akinesis, discomfort
 - Retrobulbar (lidocaine, bupivacaine)
 - Advantage – total EOM akinesis
 - Disadvantage – possible globe perforation (long eyes)

Surgery

- Anesthesia
 - Sub-tenon's block
 - Advantages – safe, total EOM akinesis
 - Disadvantages - none
 - General Anesthesia
 - Advantages - No pain, total sedation
 - Disadvantages - Complications, Cost
 - Intracameral – added when discomfort

Anesthesia

- IV Versed (benzodiazepine)
- Topical proparacaine
- NPO ...no food or drink after dinner day before surgery

Incision

- Type
 - Scleral tunnel
 - Less endothelial damage
 - Easy to enlarge
 - Must have retro-block
 - Lower endophthalmitis*
 - Clear corneal
 - Undisturbed conjunctiva
 - No retro-block needed
 - Less bleeding
 - Astigmatism control
- Location
 - Astigmatism, ocular disease, ergonomics
- Size
 - > 4.0mm - large
 - 4.0mm – 2.0mm - small
 - < 2.0mm - micro

Pre-op Medications

- Pupil Dilation
 - 1% cyclopentolate +
 - 2.5% phenylephrine
 - Dosage 1-2 drops x 10-15minutes 1 hour prior to surgery

Cataract Surgery

- ECCE – Extracapsular Cataract Extraction
 - Scleral incision 5-8mm remove lens and capsule – AC IOL
- ICCE – Intracapsular Cataract Extraction
 - Scleral or corneal Incision
 - PC IOL intracapsular placement
 - PC IOL sulcus placement
 - AC IOL

Cataract Procedure

- Incision
- Anterior Capsulorrhexis
- Hydrodissection/Hydrodelineation
- Phacoemulsification
 - Ultrasound & Aspiration
- IOL insertion

IOL

- 1 Part
 - Plate
- 3 part
 - Optic and 2 Haptics

Surgery

- IOL (Silicon vs. Acrylic)
 - Monofocal
 - DV vs. Monovision
 - Spherical vs. Aspheric
 - Multifocal
 - Refractive
 - Diffractive
 - Accommodative

IOL Calculations

- Biometry – Axial Length
 - A-scan
 - Immersion (no corneal compression)
 - IOL Master (optical no touch)
- Corneal Curvature
 - Keratometry – manual
 - Auto-keratometry
 - Topography/Tomography

IOL Calculation - Formulas

- SRK/T
 - Axial Length >22.01mm
- Holladay II
 - Axial Length < 22.00mm
 - K's flatter than 42.00D
 - K's Steeper than 47.00D
- Hoffer Q (short eyes)

Cataract Post Operative Care

- ## Cataract Post Operative Care
- Antibiotic
 - NSAID
 - Steroid

Cataract Post Operative Care

Antibiotic Medication

Most Commonly used are the 4th generation fluoroquinolone **class** of antibiotics

Resistance in older classes

Ex: Vigamox (moxifloxacin)
Zymaxid (gatifloxacin)
Besivance
(Besifloxacin)

Cataract Post Operative Care Antibiotic Medication

- Dosing TID or greater
- Do Not Taper
- Typical Order:
 Vigamox Oph Sol 5ml
 1gtt OD TID 2 weeks

Fluoroquinolone Allergies

- Cipro, Levaquin, ect.
Rare (approximately 1.2 per 100,000 prescriptions) and is even more uncommon with topical formulations.

http://www.crstoday.com/PDF%20Articles/0306/CRST0306_catcomps.pdf
Davis H, McGoodwin E, Reed TG. Anaphylactoid reactions reported after treatment with ciprofloxacin. Ann Intern Med. 1989;111:1041.
Leibowitz HM. Antibacterial effectiveness of ciprofloxacin 0.3% ophthalmic solution in the treatment of bacterial conjunctivitis. Am J Ophthalmol. 1991;112(suppl):295-335

Cataract Post Operative Care Antibiotic Medication

- Tobramycin TID
- fairly broad-spectrum activity and good activity against *Staphylococcus aureus* (although the antibiotic is particularly weak against *Staphylococcus epidermidis*)

Cataract Post Operative Care Antibiotic Medication

- “Polytrim” polymyxin B and trimethoprim
- “Neosporin” bacitracin, neomycin, and polymyxin B (high degree of allergic response)

http://www.crstoday.com/PDF%20Articles/0306/CRST0306_catcomps.pdf

Blepharitis

- Pre-treat
 - Lid Scrubs
 - Sterilid
 - OcuSoft
 - Azasite
- Patients at Risk – MRSA Carrier
 - Mupirocin gel to lid margin 5 days bid (<http://en.wikipedia.org/wiki/Mupirocin>)

http://www.crstoday.com/PDF%20Articles/0306/CRST0306_catcomps.pdf
<http://www.walgreens.com/images/drug/0100065064305.jpg>

Cataract Post Operative Care NSAID Medication

- The initial indications for their use were to maintain pupil dilation during cataract surgery, potentiate the mydriasis, or inhibit the intraoperative miosis.
- Today, use of NSAIDs in cataract surgery is in the prophylaxis and treatment of cystoid macular edema.

Roberts CW, Brennan KM. A comparison of topical diclofenac with prednisolone for post cataract inflammation. *Archives Ophthalmology*. 1995;113:725-727.
Roberts CW. Pretreatment with topical NSAIDs to decrease pain during cataract surgery. To be presented at: the ASCRS meeting; April 14, 2003; San Francisco, CA.
Roberts CW. Pretreatment with topical diclofenac sodium to decrease postoperative inflammation. *Ophthalmology*. 1996;103:4:636-639.

Cataract Post Operative Care
NSAID Medication - Dosage

- Prolensa qd
- Acuvail BID
- Nevanac TID
- Acular LS QID
- Voltaren QID
- Ocufen QID

Cataract Post Operative Care
NSAID Medication

Treatment of postoperative inflammation and reduction of ocular pain in patients who have undergone cataract surgery.¹

Typical Order:
Prolensa
1.7ml x 2 (twin pack)
1gtt OD "QD" 14 days
beginning day before surgery

Cataract Post Operative Care
NSAID Medication

- Substitutions
Nevanac - nepafenac ophthalmic suspension 0.1%

Pros:
Cost

Cons:
Cornea
Dosing tid

Cataract Post Operative Care
NSAID Medication

• Substitutions

Acular LS - KETOROLAC TROMETHAMINE 0.4%

Pros:

Cost / Ins Coverage

Cons:

Dosing qid

Cornea

Cataract Post Operative Care
NSAID Medication

• Substitutions

Acuvail - KETOROLAC TROMETHAMINE 0.45%

Pros:

Dosing bid

Cornea

Cons:

Cost / Ins Coverage

Cataract Post Operative Care
NSAID Medication

• Substitutions

Voltaren diclofenac

Pros:

Cost / Ins Coverage

Cons:

Dosing

Cornea!!

Cataract Post Operative Care NSAID Medication

- There is the potential for **cross-sensitivity** to **acetylsalicylic acid**, phenylacetic acid derivatives, and other nonsteroidal anti-inflammatory agents. Therefore, caution should be used when treating individuals who have previously exhibited sensitivities to these drugs.

Cataract Post Operative Care NSAID Medication

- Use of topical NSAIDs may result in keratitis. In some susceptible patients, continued use of topical NSAIDs may result in epithelial breakdown, corneal thinning, corneal erosion, corneal ulceration or corneal perforation.
- Discontinue NSAID immediately
- Use preservative free artificial tears
- Monitor closely

Topical Steroid

- Pred-forte 1%
(Prednisolone Acetate)
- Durezol 0.05%
(difluprednate)
- Lotemax (Loteprednol
Etabonate)

Cataract Post Operative Care Steroid Medication

- Steroid Response
- The rise in IOP takes, on average, three weeks to months. The decrease in IOP is also slow, taking weeks to resolve.
- Can occur as fast as 7 days

Cataract Post Operative Care Steroid Medication

Prednisolone Acetate 1%
Typical Order:
Pred-forte 1% Oph Sol
5ml
1gtt OD TID 2 wk then BID
for 2 wk

<http://www.drugs.com/pdr/images/O0510384.jpg>

Postoperative Visits

- 24-36 Hours
- 7-14 Days
- 3-4 Weeks
- 8-12 Weeks

24-36 Hours

- History
- UCVA
- Pinhole VA
- Slitlamp Biomicroscopy
 - Seidel's Sign
 - Corneal SPK & Wound
 - A/C Cells/Flare
 - IOL Position
- IOP
- Instructions to patient

7-14 Days

- History
- UCVA
- Autorefraction
- Dry/Wet Refraction*
- Slitlamp Biomicroscopy
 - Seidel's Sign
 - Corneal SPK & Wound
 - A/C Cells/Flare
 - IOL Position
- IOP
- Instructions to patient

3-4 Weeks

- History
- UCVA
- Autorefraction
- Dry/Wet Refraction
- Slitlamp Biomicroscopy
 - Corneal SPK
 - A/C Cells/Flare
 - IOL Position
- IOP
- DFE
- Instructions to patient

8-12 Weeks

- History
- UCVA
- Autorefraction
- Dry Refraction
- Slitlamp Biomicroscopy
 - Corneal SPK
 - A/C Cells/Flare
 - IOL Position
 - Capsule Clarity
- IOP
- Instructions to patient

Early Complications - Significant

- Wound Leak – flat chamber
- Ocular Hypertension
- Endophthalmitis
- Iris Prolapse/Vitreous in wound
- IOL dislocation/vaulting
- Retinal/Choroidal Detachment

Early Complications – Less Urgent

- Wound leak – normal chamber
- Ptosis
- Diplopia
- Corneal Edema
- Hyphema
- Hypopyon
- Pupillary Capture

Late Complications

- Ocular Hypertension/Glaucoma
- Ptosis/Diplopia
- Corneal Edema/Decompensation
- Late Hyphema
- Chronic Uveitis
- PCO
- CME

Sutures

- Most common reason is wound burn
- Will not dissolve
- Can stay in indefinitely
- If FB sensation send back to surgeon at 1-2 months to consider removal
- Lubricate while awaiting removal decision

Cataract Post Op Pearls Wound Leak - Hypotony

- Shallow Chamber
- Positive Seidel
 - Clearing of the fluorescein over the involved area due to the leak of fluid.
 - Usually noticed DOS
 - May not find this until 1 wk P/O
 - Really need to get this patient back to surgeon/center ASAP

Cataract Complications

- IOP Pressure Spike
- Types:
 - Visco (Healon) / left over nucleus or cortex
 - Spike first 24 hours
 - Steroid responder
 - Spike 1-3 weeks
 - Iritis (inflammatory glaucoma)
 - Spike 3-5 weeks

Cataract Post Op Pearls Early High IOP

- **1st week**
 - Retained visco-elastic
 - Retained Lens Fragments
 - Nucleus
 - Retinal Specialist Consult –Vitreotomy
 - Cortex
 - TX:
 - Monitor
 - IOP management
 - Return to OR
 - Must R/O infectious endophthalmitis.

Cataract Post Op Pearls

- **High intra-ocular pressure 1st week**
 - First try Alphagan P and Cosopt 2 drops 10-15 min apart..IOP check 30-45 min
 - Consider Acetazolamide 250mg (may want to consult patient's PCP)
 - "Wound burp" nor AC paracentesis

Pressures can be high
Eye Ache, Blur, Light Sensitivity
Monitor IOP 1 day, then weekly until stable

Cataract Post Op Pearls

- High intra-ocular pressure 1 -3 wks
- Steroids taken continuously for long periods of time are well known to cause a rise in intra-ocular pressure which can pose a risk for **steroid induced glaucoma**.
 - About 5% of the general population are "high steroid responder", where a large and potentially dangerous rise in eye pressure occurs after daily steroid use for 4 to 6 weeks.
 - Another third of the general population may experience a more moderate rise in eye pressure over that time frame. The remaining two-thirds of the population has a minimal rise in eye pressure.

Cataract Post Op Pearls

Treatment of High IOP 1-3 weeks with IOP lowering drugs:

Alphagan P 0.10% TID +
Cosopt BID
Trusopt (sulfa) & Timoptic (asthma COPD CHF)
Continue until steroid is D/C
Monitor IOP 1 day, then weekly until stable
Consider sending patient back to the operating surgeon

Cataract Post Op Pearls

Late High IOP 3-5 weeks

IRITIS

Usually within first few weeks
after D/C of steroid

- Light Sensitivity
- Eye Ache
- Conjunctival Injection
- AC Cells/Flare
- Blurred Vision
- Increased IOP

Cataract Post Op Pearls

Rebound Iritis

- Restart Pred 1% q1h-qid
- Compliance?
- Consider Durezol qid –taper slowly
- Treat IOP if elevated
- Monitor 1 day, 1 week, 2-4 weeks

- Taper slowly! 4 weeks tid to bid did not work

Cataract Post Op Pearls Infection

- The incidence of endophthalmitis has been reported to be between 0.13% and 0.7%.

Mamalis N, Kearsley L, Brinton E. Postoperative endophthalmitis. *Curr Opin Ophthalmol.* 2002;13:14–18.

Cataract Post Op Pearls Infection

- The primary source of this intraocular infection is considered to be bacteria from the patient's ocular surface (cornea, conjunctiva) or adnexa (lacrimal glands, eyelids, and extraocular muscles).

Buzard K, Liapis S. Prevention of endophthalmitis. *J Cataract Refract Surg.* 2004;30:1953–1959.

Cataract Post Op Pearls Infection

- The bacteria **most frequently isolated** are gram-positive coagulase-negative cocci (mainly *Staphylococcus epidermidis*) which account for **70%** of culture-positive cases. *Staphylococcus aureus* is isolated in 10% of culture-positive cases, *Streptococcus* species in 9%, *Enterococcus* species in 2%, and other gram-positive species in 3% of cases.

Mamalis N, Kearsley L, Brinton E. Postoperative endophthalmitis. *Curr Opin Ophthalmol.* 2002;13:14-18.

Cataract Post Op Pearls Infection

- **Gram-negative** bacteria account for just 6% of culture-positive cases; however, an infection with these bacteria, particularly with *Pseudomonas aeruginosa*, can lead to a **devastating visual outcome**.

Mamalis N, Kearsley L, Brinton E. Postoperative endophthalmitis. *Curr Opin Ophthalmol.* 2002;13:14-18.

Cataract Post Op Pearls Infection

- Surgical complications, in particular a **torn posterior lens capsule**, can significantly increase the risk of endophthalmitis.
- Kamalarajah S, Ling R, Silvestri G, Sharma NK, Cole MD, Cran G, Best RM. Presumed infectious endophthalmitis following cataract surgery in the UK: a case-control study of risk factors. *Eye.* 2007;21:580-586.
- The choice of intraocular lens (IOL) can affect the risk of endophthalmitis. The use of IOLs with **silicone optics** is associated with an increased risk of endophthalmitis, compared with that of IOLs with **acrylic optics**.
- <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2377381#02>

Cataract Post-Op Pearls
Iris Prolapse

Cataract Post-Op Pearls
Dislocated IOL

Retinal Detachment after Cataract Surgery

- Risk is very low (0.1%)
- Phacoemulsification poses less of a risk for this than standard surgery
- Femtosecond laser may further reduce risk

Cataract Post Op Pearls Posterior Vitreous Detachment

- The incidence of retinal detachment increases after cataract extraction, but it decreases with improved surgical technique. **Postoperative posterior vitreous detachment is a major promoter of retinal detachment** after cataract surgery and is related to onset of most retinal tears leading to retinal detachment.

Curr Opin Ophthalmol. 2008 May;19(3):239-42

- In some cases however, when the vitreous detaches it pulls a tear in the retina, sometimes causing a small amount of bleeding. This may appear as a **shower of tiny black spots in the vision**.

<http://www.alberta-retina.com/PVD.html>

Cataract Post Op Pearls Posterior Vitreous Detachment

- Important to diagnose and treated immediately
- Tear can lead to a retinal detachment
- Tear can usually be treated with laser.

<http://www.alberta-retina.com/PVD.html>

Cataract Post Op Pearls Corneal Edema

<http://www.osnsupersite.com/images/osn/200712a/man2.jpg>

Cataract Post Op Pearls

- Corneal Edema

Swelling of the corneal tissues following surgery is not uncommon. It is a response to the insertion of the surgical instruments into the eye. Usually, it develops a few hours after the procedure. While the cornea is swollen, vision is mildly distorted.

Cataract Post Op Pearls

Corneal Edema

- Reassure Patient
 - Steroid
 - Consider Muro-128 gtt or ung
- Typically resolves nicely without any changes

Cataract Post Op Pearls

- Subconjunctival Hemorrhage
- Reassure

http://www.bergeye.com/Disorders/subconj_Heme/subconj.jpg

By the time you first see the hemorrhage, the bleeding has already stopped. The blood will gradually disappear by itself, but it may take as long as two weeks to absorb completely.

Cataract Post Op Pearls

PCO

The lens capsule is the thin, elastic-like bag that holds the intraocular lens (IOL) in position after cataract surgery. During the operation, the front (anterior) portion of the lens capsule is carefully opened and the cataract is removed. The IOL is inserted into the remaining (posterior) portion of the capsule.

<http://www.stlukeseye.com/conditions/PChaze.asp>

Cataract Post Op Pearls

Posterior Capsule Opacification

<http://www.stlukeseye.com/conditions/PChaze.asp>

Cataract Post Op Pearls

PCO

Posterior capsular opacification (PCO), which is the most common complication of cataract surgery occurring in up to 50% of patients by 2 to 3 years after the operation. PCO is caused by lens epithelial cells retained in the capsular bag following surgery which then proliferate, migrate and transform to myofibroblasts.

Eye. 1999 Jun;13(7):489-92.

Posterior capsular opacification affects about 1 in 4 people within 5 years of having cataract surgery. The cloudiness may develop gradually over several months or years.

Schaumberg DA, et al. (1998). A systematic overview of the incidence of posterior capsule opacification. *Ophthalmology*. 105(7): 1213-1221.

Cataract Post Op Pearls

PCO

- The most common cause of posterior capsule opacification (PCO) is proliferation and migration of retained lens epithelial cells and their derivatives into the visual axis.

<http://herkules oulu.fi/isbn9514259793/html/c169.html>

Cataract Post Op Pearls

PCO

Treatment YAG capsulotomy
“yttrium aluminum garnet”

The principle of Nd: YAG laser capsulotomy in treating PCO is to cause photodisruption at extremely high energy levels, thereby disintegrating tissues (Bell & Landt 1967, Barnes & Rieckhoff 1968, Fradin *et al.* 1973, Aron-Rosa *et al.* 1981, Ficker & Steele 1985).

<http://herkules oulu.fi/isbn9514259793/html/c169.html>

Cataract Post Op Pearls

PCO

- This is an outpatient procedure and involves no incision.
- Using the laser beam, the physician makes an opening in the clouded capsule to let light through.
- After the procedure the patient remains in the center for an hour to be sure that pressure in the eye is not elevated.
- An eye examination for any complications should follow at 1 week.

Cataract Post Op Pearls YAG - Complications

After an analysis of 3000 Nd: YAG laser capsulotomies, Shah *et al.* (1986) detailed the following complications:

- Marks on IOL - 12%
- Transient elevation of IOP - 8.5%
- Cystoid macular edema - 0.68%
- Retinal detachment - 0.17%
- Hyphema - 0.15%
- Iritis - 0.10%
- IOL entrapment 0.10%.

<http://herkules.oulu.fi/isbn9514259793/html/c169.html>

Cataract Post Op Pearls YAG for PCO

- Nd:YAG laser posterior capsulotomy is not used to prevent clouding of the back lining of the lens capsule (posterior capsule opacification). There is no way to know who will get clouding in the back of the eye after cataract surgery. Certain lenses used in the surgery to remove the cataract may lower this risk and the need for laser surgery later.

Cataract Post Op Pearls CME

- Cystoid Macular Edema

About **3%** of patients undergoing cataract extraction will have visual reduction due to CME within the **first postoperative year**.

Coscas G, Gaudric A. Natural course of nonaphakic cystoid macular edema. *Surv Ophthalmol* 1984 May;28 Suppl:471-84.

Cataract Post Op Pearls

CME

Visual acuity may or may not be reduced. If reduced, vision ranges from 20/25 to 20/400 depending on the severity of the edema.

Patients may also experience metamorphopsia.

http://www.revoptom.com/HANDBOOK/oct02_sec5_1.htm

Cataract Post Op Pearls

CME

- Fluorescein angiography most effectively displays true appearance of CME, demonstrating leaky perifoveal capillaries in the early stage with a petalloid flower appearance in late phases.

http://www.revoptom.com/HANDBOOK/oct02_sec5_1.htm

CME TREATMENT

Topical nonsteroidal medications

Acular (ketorolac, Allergan) and Voltaren (diclofenac, Novartis Ophthalmics)

Topical corticosteroid drops such as Pred Forte (prednisolone acetate, Allergan) and Lotemax (loteprednol, Bausch & Lomb).

Common dosing ranges from qid to q2h. Often a loading dose of q2h is indicated, and then rapidly dropped to qid after several days.

http://www.revoptom.com/HANDBOOK/oct02_sec5_1.htm

Cataract Post Op Pearls

CME

- New advances in diagnostic technology make it easier to identify CME. The Heidelberg Retinal Tomograph II and the Optical Coherence Tomography are effective and noninvasive devices that can identify CME.

http://www.revoptom.com/HANDBOOK/oct02_sec5_1.htm


