



# Best Practices

in Integrated Care

CRST  
Cataract & Refractive Surgery Today

AOC  
Advanced Ocular Care

Volume 2, No. 5

**BAUSCH+LOMB**



# Best Practices

in Integrated Care

This ongoing series, now in its second year, is featured in each issue of *AOC* and its sister publication, *CRST*. The articles will clarify how eye care providers can best work together to provide patient-centered care of the highest quality possible.

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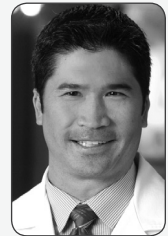
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# TIPS FOR MANAGING POSTOPERATIVE PAIN

Most cases are mild and self-limiting, but each should be investigated to understand the cause.

BY JOSH JOHNSTON, OD, FAAO



Reports of pain after ocular surgery are not uncommon, although it is rare for patients to experience serious consequences as a result. Any report of ocular pain or discomfort should be investigated as a potential harbinger of something serious, even though mild pain is to be expected after any surgery.

Surgery is the act of treating a condition or illness by means of an incisional procedure. Every eye surgery is controlled trauma to the eye—although, we hope, mild trauma—which inherently induces an inflammatory response.

Fortunately for patients, modern techniques for ocular surgery, and for cataract surgery in particular, are intended to be minimally invasive and therefore less likely to induce a severe inflammatory response. Still, inflammation can cause pain, light sensitivity, redness, and other disconcerting symptoms.

Inflammation is likely the most common cause of postoperative pain, although it is only one potential trigger. Pain after ocular surgery can be caused by many factors, and most cases are easily treated.

This article discusses some of the common causes of pain during the postoperative period.

### COMMON CAUSES OF POSTOPERATIVE PAIN

Dry eye disease (DED) or other ocular surface disease that was not adequately treated before surgery is a common cause of postoperative irritation. It should be noted that an irregular tear film, even in an eye treated for DED, can react unpredictably to surgery. Therefore, even treated patients with DED may be at greater risk for pain and discomfort after surgery. Thus, the potential for postoperative pain is another reason to carefully assess surgical candidates for ocular surface abnormalities during preoperative workup. Eyes with only mild DED or meibomian gland dysfunction are still at risk for postoperative issues.

Surgically induced inflammation is both an independent and an additive risk factor for postoperative pain. For example, inflammation can exacerbate DED and other ocular surface issues. In addition, the topical agents used to control inflammation postoperatively can sometimes worsen ocular surface issues, and patients may report this as pain, discomfort, or irritation. Finding the root cause of pain is paramount, and the perception of pain may be multifactorial in nature.

Systemic diseases can contribute to and worsen ocular inflammation, therefore inflammatory components should also be considered as sources of postoperative pain. Ocular conditions such as uveitis or iritis and systemic conditions such as a history of autoimmune disease (eg rheumatoid arthritis, Crohn's disease, ulcerative colitis, or scleritis) should be signals for extra vigilance.

Certain procedures performed during ocular surgery should also be considered as potential sources of irritation if a patient is complaining of postoperative pain. Limbal relaxing incisions or other refractive procedures such as LASIK and PRK may cause damage to the nerves of the cornea. If patients have had these procedures, it is worthwhile to check the integrity of the cornea to make sure there is not an epithelial defect causing the pain. Limbal relaxing incisions cut with a blade can develop filamentary keratitis or debris around the incision site. Although rare, abrasions can be caused by the docking mechanisms of some femtosecond laser platforms.

Another potential source of postoperative pain is increased IOP, which can be caused by a number of etiologies. Inflammation is one potential inciting mechanism for elevated IOP. Most cases of increased IOP on the day of surgery or postoperative day 1 are due to retained viscoelastic material. In these cases, patients typically need a topical antihypertensive agent to lower pressure, although in several cases, an oral medication such as acetazolamide (Diamox; Teva) may be considered. A paracentesis may be necessary to manually "burp" the wound and release the viscoelastic.

In our practice, the surgeons take a little extra time during the irrigation/aspiration step performed in cataract patients with a known history of glaucoma to ensure that all of the viscoelastic material is removed from the eye.

### POSTOPERATIVE PAIN MANAGEMENT

Topical drugs used postoperatively can be both a blessing and a curse with regard to pain. On the one hand, when applied properly, topical nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroids, and antibiotics help to control inflammation and infection, both of which are potential pain mechanisms. Getting patients to comply with drop regimens, however, is notoriously difficult. Even patients with the best of intentions may fail to properly instill drops. Patients, especially elderly cataract patients, may struggle to squeeze the medication bottle, the drops may miss the eye, and the act of squeezing the bottle may not produce an adequate dosage. Perhaps most confounding is that topical emulsions require patients to shake the bottle to properly mix the ingredients; failure to do so can result in inadequate drug delivery. The bottom line is that, although topical drugs are effective, poor compliance can leave patients at risk for postoperative inflammation and pain.

In our practice, we treat all patients preoperatively with an antibiotic to lower the potential for microbial growth postoperatively. Topical antibiotics and an NSAID are given for 2 days before surgery, and steroids are started the day of surgery. All three medications are then continued postoperatively.

Another agent used on the day of surgery also indirectly helps reduce postoperative pain. Cycloplegic agents have several effects: they relax the ciliary muscle's spasm reflex, they help to prevent posterior synechiae, and they stabilize the blood aqueous barrier, all of which helps to reduce cell and flare in the anterior chamber. Thus, using a mydriatic agent during surgery can positively affect the potential for surgical inflammation and postoperative pain. Cycloplegics can also be used during the postoperative period to provide relief and decrease accommodation, which can trigger pain sensation.

There are differences between generic and branded formulations of postoperative topical medications that are important to consider in the context of postoperative pain. A few years ago in our clinic, we had many patients present as emergency walk-ins with red eyes postoperatively. After some investigation, we realized that a number of cases of rebound inflammation were taking place in patients using



generic medications. We switched from prescribing a generic steroid to difluprednate ophthalmic emulsion 0.05% (Durezol; Alcon). We have not had this issue since. Presumably, that is because of better efficacy of the branded compared to the generic medication as well as a more consistent dose delivery. There is evidence in the literature for this; studies show that difluprednate is more efficacious than generic prednisolone acetate.<sup>1</sup> In addition, the dose of prednisolone acetate that is instilled into the eye can change depending on how the bottle is stored or shaken before use.<sup>2</sup>

Often overlooked in the management of corneal abrasions after surgery is the beneficial role that a bandage contact lens can play. A bandage lens soaked in a topical NSAID can have a dual effect, assisting the healing process and also reducing inflammation and pain.

Another option that should not be forgotten is the use of over-the-counter pain relievers, such as acetaminophen. This is a reasonable option for patients with acute onset of pain in the first few postoperative days.

### CONCLUSION

Modern ocular surgery—especially cataract surgery—is minimally invasive. There are steps eye care providers can take to further minimize the impact of surgically induced trauma. Preoperatively unmasking ocular surface conditions such as DED or meibomian

gland dysfunction is paramount for decreasing discomfort and irritation after surgery. It is more important to closely follow patients with a known history of autoimmune or systemic factors that might increase the risk of inflammation and pain after surgery.

Patients' reports of postoperative pain are highly subjective, but it is important for practitioners to try to understand the source of the problem as much as possible. The etiology of the pain will help guide the management strategy.

Often, pain occurring after surgery can be due to inflammation. In such cases, topical therapy directed at inflammation can be helpful, and the potential role of cycloplegic agents in palliative relief should not be overlooked.

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# PERIOPERATIVE DRUG DELIVERY: IMPROVED COMPLIANCE, LOWER COST

Fixed-combination medications given at the time of surgery may help streamline postoperative care.

BY RICHARD B. MANGAN, OD, FFAO



Eye care professionals who treat patients during the perioperative cataract surgery period are aware of the important role of topical medications, but at the same time, they likely also appreciate the limitations and difficulties that are inherent to their use.

Topical antibiotics help patients avoid vision-threatening infections, and topical nonsteroidal anti-inflammatory drugs (NSAIDs) and corticoste-

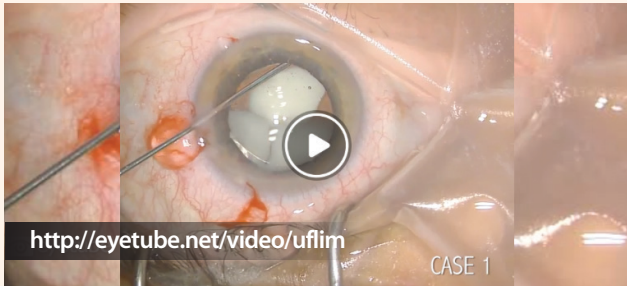
roids help to reduce inflammation that can slow the healing process and delay visual recovery. Although modern cataract surgery is minimally invasive and, therefore, likely to induce minimal inflammation, topical drop therapy still has a rationale. It is better to prevent postoperative inflammation such as cystoid macular edema (CME) than to treat it.

Ensuring effective delivery of perioperative topical medications on an appropriate schedule is challenging. Patients' adherence to



## WATCH IT NOW

Jeffrey Liegner, MD demonstrates the injection of TriMoxiVanc.



<http://eyetube.net/video/uflim>

CASE 1

drop regimens is hindered by multiple factors. Recently, the possibility of using intracamerally administered combination medications at the time of surgery has emerged as a plausible means to deliver these medications while eliminating barriers to their use. Fixed-combination medications offer an opportunity to improve patients' surgical experience.

This article discusses fixed-combination medications that are available for intraoperative use in the United States: the Dropless Cataract Surgery formulations from Imprimis Pharmaceuticals, and the combination mydriatic-NSAID Omidria (phenylephrine and ketorolac injection, 1.0%/0.3%; Omeros). Although these are the only such medications now available in the US market, this category promises to grow as the benefits of their use become apparent.

### NO-DROP SURGERY

Imprimis offers two formulations of compounded medications that can be injected at the conclusion of cataract surgery: Tri-Moxi (triamcinolone acetonide and moxifloxacin HCl) and Tri-Moxi-Vanc (triamcinolone acetonide, moxifloxacin HCl, and vancomycin). Although these formulations are not approved for use during cataract surgery by the US Food and Drug Administration, each of the components of the compounded formulations is, and Imprimis pharmacies are accredited by the US Pharmacy Compounding Accreditation Board.

The two compounded formulations are designed to replace the need for topical medications to be administered by patients postoperatively. As simple as that sounds, removing the need to properly instill drops according to a potentially complicated schedule removes a major impediment to the use of these medications. Topical antibiotics, NSAIDs, and corticosteroids are, of course, most effective when they are applied correctly.

The availability of these so-called dropless products is relatively new, but the idea of using compounded medications in this fashion has been around for more than a decade. In a previous professional capacity, I worked with Kevin Scripture,



## LISTEN UP

Gary Wörtz, MD, dissects the topic of dropless surgery with Drs. Bill Wiley and Mark Kontos.

<http://bit.ly/2aKlsXF>

MD, who was one of the early adopters of the concept in the early 2000s. Our clinic contracted with several compounding pharmacies to prepare products for use during cataract surgery; I have personal experience of collaborative care in more than 20,000 cases of no-drop surgery to date.

In my experience, no-drop cataract surgery streamlines the postoperative period for patient and provider: Patients' need to comply with a regimen is eliminated, and the provider does not waste time and resources answering questions and dealing with insurance issues related to the topical therapies. One of the biggest reasons we adopted the no-drop approach, however, was that pharmaceutical companies stopped providing samples of perioperative topical drugs. This had the unintended effect of adding more out-of-pocket expense for patients. Even patients with insurance coverage can wind up paying \$400 or more in copayments for these medications. Therefore, no-drop surgery became a means to ensure that patients were getting the drug coverage they needed without cost or practical burdens.

Compliance and cost are obvious barriers to the use of medications in the postoperative period, but there may be additional hardships experienced by patients that providers do not consider. For example, I have had many patients tell me they did not want to burden family members or have to use care providers to help them administer their drops. Others have difficulties instilling the drops due to comorbid conditions such as arthritis. In addition, the use of multiple drops after surgery can cloud vision and slow down the recovery of acuity; for patients who are paying extra for a premium lens (and a premium experience), this can be a major concern.

Fixed formulations may not be appropriate for every patient. For example, their use in patients with a known fluoroquinolone allergy is contraindicated because of the inclusion of moxifloxacin. Also, some physicians are hesitant to use steroid-containing formulations in patients with moderate to advanced glaucoma. In my experience, however, postoperative IOP spikes are rare.

There is some concern that rates of CME may actually be higher after no-drop surgery due to insufficient coverage by the NSAID component. In previous experience using products from various compounding pharmacies, prior to the availability of the Imprimis products, we experienced different rates of CME depending on which compounding pharmacy produced the batch (unpublished

data). This variability would suggest that the risk of CME is somewhat dependent on the source of the compound and not necessarily associated with use of the compounded formulation itself.

I was involved in a prospective study in which we performed optical coherence tomography imaging at baseline and again 3 months after surgery to assess CME. We enrolled 200 patients; 100 underwent no-drop surgery, and 100 used topical drugs postoperatively. We did not observe any noticeable difference in rates of CME in the two groups (unpublished data).

### MYDRIASIS AND PAIN REDUCTION

Part of the minimally invasive nature of modern cataract surgery is the use of the femtosecond laser to fragment the cataract, reducing the need for ultrasound energy. Theoretically, this leads to less turbulence and energy delivery to the eye, each of which could instigate an inflammatory response. The potential for postoperative inflammation cannot be removed completely, despite the best efforts of the surgeon and the techniques he or she uses.

Omidria is a surgical adjunct added to the irrigation solution and infused through the irrigation line during cataract surgery, thus available to the intraocular structures throughout the procedure. The phenylephrine component is intended to maintain pupil dilation and prevent miosis. Preserving pupil dilation allows the surgeon to more easily perform intraocular maneuvers. Therefore, this component of the compound has an indirect effect on the safety of the procedure.

The NSAID component, ketorolac, is a prostaglandin inhibitor that contributes to the prevention of miosis and also helps to reduce postoperative pain. In a phase 3 clinical trial, this fixed combination outperformed placebo in preventing miosis and controlling patient-reported pain.<sup>1</sup> Administered intracamerally, the drug may also inhibit the activity of inflammatory mediators throughout the ocular anatomy (retina, cornea, sclera, vitreous, choroid, lens capsule, ciliary body, and iris), thus potentially providing protection against retinal inflammation.<sup>2</sup>

### CONCLUSION

The category of compounded medications used during surgery represents a relatively new drug delivery strategy. In the

future, external reservoirs, drug-eluting contact lenses, or other devices may play a role in delivering the medications patients need during the postoperative period. For now and the foreseeable future, however, the options discussed herein provide a rational means of enhancing the efficacy of drug delivery.

Noncompliance with a postoperative regimen can occur for many reasons. Patients may be unwilling or unable to pay out of pocket for the drugs or the copayment. Forgetfulness can play a role, especially given the complexity of using up to three drops, potentially with different administration times during the day. Physical inability may inhibit delivery of the desired dose to the ocular surface. Whatever the reason, when patients are unable to use topical therapy as instructed during the postoperative period, there is an increased risk of complications. Fixed-combination medications instilled during surgery are a mechanism to streamline postoperative care, reduce costs, and take the burden of instilling drops away from the patient.

In my experience, no-drop cataract surgery is a significant upgrade over asking patients to self-administer topical antibiotics, NSAIDs, and corticosteroids. The techniques for their use are not difficult, and these products are fairly easy to incorporate into practice. In the setting of premium IOLs, when patients are expecting a premium experience, any step the eye care team can take to reduce postoperative burden is an asset. Frankly, all patients, even those who do not pay the additional charges associated with multifocal or toric IOLs, deserve the best chance of achieving a positive outcome.

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# TOPICAL DRUGS IN THE PERIOPERATIVE PERIOD

Differences between generic and branded formulations are important to consider.

BY BARRY A. SCHECHTER, MD



Cataract removal with placement of an IOL is the most commonly performed surgical procedure in the United States, with an estimated 3 million cases per year. It is typically very safe and is associated with a low rate of complications.

The femtosecond laser has been a welcome addition to cataract surgery technology. The ability to fragment and soften the cataractous lens may reduce the need for ultrasound energy, and laser-assisted capsulorhexis automates this delicate and important step. As a result, the extent of intraocular manipulation can be reduced, along with the potential for agitating ocular tissues and inducing inflammation.

Another aspect that contributes to the safety of cataract surgery is the use of topical medications during the perioperative period to minimize inflammation and theoretically lower the risk for microbial infections. Not all topical drug formulations are created equal, however, and there can be important differences between branded and generic formulations of the antibiotics, corticosteroids, and nonsteroidal anti-inflammatory drugs (NSAIDs) commonly used before and after cataract surgery.

## ANTIBIOTICS

Topical antibiotics are often used before surgery and in the early postoperative period to reduce microbial populations on the eyelids, ocular surface, and ocular adnexa, theoretically limiting the potential for infections. The biggest concern is of the development of endophthalmitis, a vision-threatening complication that can destroy the eye in the most severe cases. Although the ability to prevent infection with prophylactic antibiotics has never been demonstrated in a prospective clinical trial, topical antibiotics are associated with few risks and complications, so the risk-benefit ratio for using them in the perioperative period has been considered favorable.

The role of intracameral antibiotics in cataract surgery remains controversial in the United States, although the practice is increasing worldwide. The prospective multicenter European Society

of Cataract and Refractive Surgeons (ESCRS) study of antibiotic prophylaxis found a fivefold reduction in the risk of postoperative endophthalmitis with the use of intracameral cefuroxime compared with topical antibiotics.<sup>1</sup> When practice patterns began to change in Europe as a result of these findings and the findings of other similar studies, the pharmaceutical industry there responded by introducing a formulation of cefuroxime for use in intracameral injection (Aprokam; Thea Pharmaceuticals).

No similar response has been forthcoming from US ophthalmic drugmakers, who would face significant hurdles to achieve FDA approval for a new intracameral agent. However, compounded combination medications formulated for intracameral use have become available in the US market (Dropless Cataract Surgery formulations from the compounding pharmacy Imprimis Pharmaceuticals). The formulations available from Imprimis contain a steroid and one or two antibiotics (triamcinolone acetonide and moxifloxacin [TriMoxi] and triamcinolone acetonide, moxifloxacin, and vancomycin [TriMoxiVanc]).

Both of these products contain moxifloxacin, a fluoroquinolone antibiotic that provides good coverage, with demonstrated activity against Gram-positive and Gram-negative microbes. However, the emergence of organisms resistant to moxifloxacin has been reported, and previous systemic use of a fluoroquinolone has been identified in vitro as a risk factor for fluorquinolone resistance in ocular cultures.<sup>2</sup> Therefore, the issue of potential resistance is important to consider in choosing a prophylactic agent. The American Society of Cataract and Refractive Surgery has recently issued a clinical alert regarding the association of hemorrhagic occlusive retinal vasculitis or HORV, a potentially blinding, late complication associated with intracameral vancomycin use.<sup>3</sup> A registry has been formed to amass data, which may lead to a reduction in intracameral vancomycin use. In addition, in my experience, the steroid component of compounded formulations may not last sufficiently in eyes with darker irides, which have the potential for a more robust inflammatory response; there may be a risk in these patients for rebound iritis. For the time being, therefore, I have stuck with perioperative topical medications rather than moving to intracameral use.

The Antibiotic Resistance Monitoring in Ocular Microorganisms (ARMOR) surveillance study has found that resistance to one or more antibiotics is prevalent in ocular isolates.<sup>4,5</sup> In its most recent report, methicillin resistance was prevalent among staphylococcal isolates from ocular infections (42% to 49%), and many strains demonstrated multidrug resistance, including resistance to earlier-generation fluoroquinolones.<sup>5</sup> These findings suggest that increased vigilance is warranted to reduce significant infection-related visual loss.

Besifloxacin (Besivance, Bausch + Lomb) is the latest topical ophthalmic fluoroquinolone antibiotic, specifically formulated for topical ophthalmic use, indicated for treatment of bacterial conjunctivitis.<sup>6</sup> Because it has never been used systemically, common ophthalmic microorganisms have demonstrated little resistance to this relatively new agent.

I routinely start patients on a topical antibiotic 1 to 3 days before surgery, depending on the presence of comorbidities, such as diabetes or immunosuppression due to systemic disease or drugs. For patients who demonstrate poor lid hygiene, eyelid scrubs to reduce bacterial cell counts on the lashes and a full week of a broad-spectrum antibiotic ointment such as azithromycin is employed. I always check for silent dacryocystitis at the initial preoperative consultation by compressing the lacrimal sac, which can serve as a nidus for bacterial growth; this has saved my patients and me from significant difficulties in my more than 20 years of practice.

### ANTI-INFLAMMATORY DRUGS: STEROIDS AND NSAIDs

Topical corticosteroids and NSAIDs function synergistically and complement one another, as they each suppress the formation of prostaglandin at different points on the arachadonic acid pathway. Studies have shown that patients using a steroid and an NSAID concurrently during the postoperative period exhibit less visually significant macular thickening and macular edema.<sup>7-10</sup> Unless a patient is a known steroid responder, I am of the opinion that both steroids and NSAIDs should be given postoperatively.

Intraoperatively, an NSAID can also be helpful in preventing intraoperative miosis and prostaglandin formation, which can be a significant cause of operative complications. Omidria (ketorolac and phenylephrine; Omeros) is a fixed-combination drug that can be placed in the irrigating solution to bathe the intraocular tissues throughout the surgical procedure, reducing pain and keeping the pupil dilated.

#### Corticosteroids

Three types of corticosteroids are available for ophthalmic use: ester steroids (eg, loteprednol etabonate ophthalmic suspension 0.5%; Lotemax, Bausch + Lomb), ketone steroids (eg, prednisolone acetate 1%; Pred Forte, Allergan), and halogenated steroids (eg, difluprednate ophthalmic emulsion 0.05%; Durezol, Alcon). Of the three, ester steroids are believed to carry the lowest risk of IOP elevation after cataract surgery because they are quickly broken down by

## WATCH IT NOW

Barry Schechter, MD, discusses generic medications.



esterases. Thus, an ester steroid is a good option for patients with known glaucoma or borderline IOP issues.

Glaucoma is not an absolute contraindication to the use of a topical steroid. In patients with risk factors for development of postoperative cystoid macular edema, such as macular drusen, epiretinal membrane, or a history of diabetes, the steroid is helpful to stave off the potentially serious complication. Antiglaucomatous medications may be used as needed if IOP elevation is seen postoperatively with the use of steroids. To reduce the risk of IOP elevation, I prescribe the steroid twice daily (steroids are usually indicated for use four times daily) and taper after a shorter than usual period.

In patients with dense cataracts, especially if I am not using a laser for nucleus fragmentation, difluprednate may be more useful. Anecdotally, I have found that steroids are more potent in suppressing and resolving inflammation and edema.

With regard to generic versus brand-name corticosteroids, there are important differences. Studies have found that branded medications are more consistent in both particle size and dose uniformity.<sup>11,12</sup> For example, with generic prednisolone, which is a suspension, the patient must shake the bottle before instillation to mix the ingredients; if this is not done, there may be inadequate steroid coverage from a watered-down drop and therefore an increased risk for inflammation.

#### NSAIDs

I prescribe postoperative NSAIDs for all cataract patients unless there is a contraindication, such as a potential for developing corneal pathology, a previous diagnosis of rheumatoid arthritis, or a history of corneal melts. Topical NSAID use fell out of favor in the ophthalmic community due to well-publicized reports of corneal melts following use of some generic formulations. In the late 1990s, a survey by the American Society of Cataract and Refractive Surgeons identified at least 200 cases of corneal toxicity associated with the use of a generic formulation of diclofenac from Falcon Pharmaceuticals), and also cases associated with Voltaren (diclofenac sodium, Ciba Vision) and Acular (ketorolac tromethamine, Allergan).<sup>13</sup> However, at least some of the involved eyes had unrecognized comorbid conditions that may have contributed to the development of the corneal issues.<sup>14</sup>

Because NSAID use can cause corneal issues in some patients, I use branded formulations whenever possible. Generally, these can be dosed less frequently and are more gentle to the ocular surface



because they contain and therefore introduce less preservative. These formulations have been studied in rigorous clinical trials and are consistent from dose to dose. The generic formulations, despite having equivalent active ingredients and similar delivery systems, can differ in the inactive ingredients and in the amount contained in each drop, which can affect both the safety and efficacy of the medication.

## CONCLUSIONS

I tailor the topical therapy regimen used in the perioperative period to the particular needs of the cataract surgery patient. When insurance coverage is not an issue, I prefer patients to use branded medications. I do not always have an objection to using generic medications per se, and they certainly may have a role for patients who are restricted by costs. Some patients' insurance carriers insist on generics as the only option.

Anecdotally, patients tend to complain of burning and stinging upon instillation more often with generic than branded medications. In my bottom-line rationale regarding the branded-versus-generic debate, I ask myself, "What drop would I want to use if it were a family member's eye undergoing surgery?" If the answer to that question is a branded medication, why should it be any different for patients who entrusts me with their vision? I expressed my preference for branded medications in a point/counterpoint in this publication 5 years ago,<sup>15</sup> and I can report at this time that I have not changed my opinion since then. ■

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# MANAGING IOP SPIKES

IOP spikes are common in the postoperative period but rarely lead to serious complications.

BY MICHAEL SUMMERFIELD, MD



Most cases of elevated IOP after cataract surgery are either self-limiting or easily managed. The cases that require scrupulous workup and aggressive treatment are, fortunately, few and far between. When serious IOP-related complications do occur, however, they should be managed aggressively to avoid potentially sight-threatening complications.

## RISK FACTORS

Managing postoperative IOP spikes begins during the preoperative evaluation. As is the case with most complications, prevention is the best strategy. Proactively identifying patients at risk for IOP-

related issues is key. Meticulous surgery coupled with vigilant follow-up throughout the perioperative period will minimize the risk.

Patients most at risk for IOP issues postoperatively are, naturally, those with existing ocular hypertension or glaucoma. Another risk factor for IOP spikes after cataract surgery is high myopia.<sup>1</sup>

The potential for IOP spikes is also elevated after complicated procedures, particularly if a secondary surgery such as vitrectomy is required. This can be due to extensive use of an ophthalmic viscosurgical device (OVD), which can be retained in the angle. Extra surgical maneuvers and time in the eye increase the potential for inflammation that can affect aqueous pathways leading to increased IOP.

Intuitively, one might expect patients with narrow angles preoperatively to be at risk for IOP issues. In my practice, I watch

these patients closely, but I rarely see IOP spikes after surgery. This is likely due to the lens' removal opening the angle thus mitigating this risk factor. Similarly, cases performed by residents would seem to be at higher risk than those performed by attending surgeons; however, studies in the literature are divided on whether there is a correlation between resident surgeries and IOP elevation.<sup>2,3</sup>

### INTRAOPERATIVE MEASURES

The best protection against IOP spikes may be meticulous surgery. Extra care should be taken in high-risk eyes to completely remove all OVD, especially in patients with known glaucoma. This step may require extra time in the irrigation/aspiration phase. If a femtosecond laser is available to perform nucleus fragmentation, this should presumably lessen the need for OVD use and therefore lower the chances of inducing inflammation with ultrasound. Dick et al have described a technique for complete avoidance of OVD use during laser cataract surgery.<sup>4</sup> This approach likely needs additional investigation before wider adoption.

The type of OVD used during cataract surgery can influence the potential for the material to be retained. Some studies suggest that cohesive OVDs may have a greater potential to become stuck in the trabecular meshwork due to their higher molecular weight.<sup>5</sup> However, there are also studies showing no difference in cohesive and dispersive OVDs in terms of postoperative IOP spikes.<sup>5</sup>

When extracapsular cataract surgery was more widely performed, it was not uncommon for surgeons to use a topical agent such as timolol prophylactically to reduce the potential for postoperative IOP elevation. Some surgeons still do this, although it has largely fallen out of favor with modern cataract surgery techniques and technologies.

### POSTOPERATIVE MEASURES

In my practice, I try to examine high risk patients 3 to 5 hours after surgery to get a sense of the early healing period. It is not uncommon to see slightly elevated IOPs during the same day, even in uncomplicated cases. These mild elevations into the mid-20 mm Hg range typically normalize by the next day. I know that many physicians do not routinely check the IOP on the day of surgery, but I find it helps me to understand the overall pattern of IOP—its peaks and troughs—throughout the postoperative course.

In settings where coordinated care is practiced, it is not uncommon for an eye care professional other than the surgeon to monitor follow-up care. For patients being managed under shared care who fall into one of the categories mentioned, it may be desirable for the surgeon to be closely involved in the early postoperative period in case an additional procedure is required. At the very least, the other members of these patients' eye care team should be alerted to the potential risk of IOP elevation so that extra vigilance can be undertaken.

What exactly constitutes an elevated IOP is debatable. One school of thought counts IOPs greater than 28 mm Hg as ele-

vated and warranting intervention. I prefer to look at patients individually to determine whether intervention is required. For instance, I would be more aggressive in a patient with glaucoma, whereas a younger patient with no known history of IOP issues and a healthy optic nerve may be able to be monitored before treatment is initiated. I usually use a cutoff of 28 mm Hg in asymptomatic patients with no known glaucoma as a threshold for instituting topical therapy; higher IOPs or symptomatic cases require more aggressive approaches.

When I use a drop to lower IOP on postoperative day 1, I like to see if there is a response in the first couple of hours. I find that patients who respond well to the initial topical drop do very well. Their course is generally benign, and I leave them on the topical agent for 3 days. If there is minimal response, I know there is a need for more careful follow-up and treatment. This may include instituting oral agents, such as acetazolamide, or performing anterior chamber paracentesis.

For glaucoma patients, I make sure that they know to continue their glaucoma medications throughout the postoperative period.

### ELEVATING CARE

Because the occurrence is so common, managing IOP spikes after cataract surgery should be within the purview of most if not all anterior segment surgeons. Especially for high-volume surgeons, IOP spikes are inevitable. I would certainly feel comfortable referring to a glaucoma specialist should the case warrant such care; however, in all my years of practice, I have yet to need to do that.

When IOP spikes occur in the context of collaborative care, it pays to have established relationships with your network. If such an event occurs, the referring optometrist or the person following the case postoperatively should feel absolute comfort contacting the surgeon to discuss the case. I make it a practice to communicate with the partner doctor who manages the cases with me on the day after surgery. I have found it valuable to be personally involved in the care of patients and to serve as a resource for those in my referral network whenever needed. ■

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