Potential postoperative complications of cataract surgery include inflammation, endophthalmitis, and cystoid macular edema (CME). Traditionally, to avoid these undesirable events, patients are given three topical drops after cataract surgery: an antibiotic, a steroid, and a nonsteroidal anti-inflammatory drug (NSAID). Postoperative treatment with these medications can lead to out-of-pocket costs and compliance issues for patients.

Patients mean well, but adherence to topical medication regimens after cataract surgery is generally not good. One study found that 50% of patients took less than half and 20% took less than a quarter of their prescribed medications after cataract surgery.1 In reaction to this lack of adherence, some surgeons have recently replaced the traditional postoperative topical protocol with intraoperative administration of intracameral antibiotics or single intravitreal injections of steroid-antibiotic combinations.

Risk of infection following cataract surgery is a major concern, and endophthalmitis is the most feared postoperative infection. Published rates of endophthalmitis cases range from about one in 1,000 to one in 5,000.2,3 There is evidence that an intracameral antibiotic approach could offer superior protection compared with the use of topical antibiotics,4 but the debate continues with passion and a relative lack of science. Use of intracameral antibiotics remains controversial in the United States, mainly because there is no commercially available antibiotic product approved for intraocular use by the US Food and Drug Administration.

**LANDMARK TRIAL**

The European Society of Cataract and Refractive Surgeons’ study of prophylaxis of postoperative endophthalmitis after cataract surgery, published in 2006, is widely accepted as a landmark trial in regard to intracameral antibiotic use.4 Patients in the study were randomly assigned to one of four groups to receive topical medication alone, intracameral antibiotics alone, both antibiotics, or no antibiotics. The groups not receiving intracameral antibiotics had a fivefold greater incidence of endophthalmitis compared with those receiving intracameral antibiotics. This study is the only published prospective trial that has compared topical antibiotics to an intracameral approach.

A large retrospective US study, comparing trends over time, also favored the intracameral approach.5 The study looked at endophthalmitis rates in three periods over a 5-year span of time from 2007 to 2011, as the use of intracameral antibiotics was adopted in a large hospital system. Investigators noted a 2.2-fold decline in endophthalmitis in the second period, when most patients received intracameral cefuroxime, compared with the first period when primarily topical antibiotics were used. An additional tenfold decrease was observed during the final 2 years of the study, when all
patients received either intracameral cefuroxime, moxifloxacin, or vancomycin.

NEW FORMULATIONS

Ideally, an antibiotic for intracameral or intravitreal injection should provide a broad spectrum of coverage and have a low minimum inhibitory concentration and long half-life. Vancomycin is very effective against Gram-positive bacteria but only covers those bacteria. It also is effective against the increasingly prevalent methicillin-resistant Staphylococcus aureus. Cefuroxime, similarly to vancomycin, has excellent Gram-positive coverage, as well as moderate Gram-negative coverage. Moxifloxacin HCl has broad coverage of both Gram-positive and Gram-negative bacteria and is well tolerated in the eye.

New formulations that have become available this year are ushering in the possibility of dropless cataract surgery. Multiple compounded drug formulations have been introduced, including Tri-Moxi (Imprimis Pharmaceuticals), a combination of moxifloxacin and the steroid triamcinolone acetonide, and Tri-Moxi-Vanc (Imprimis Pharmaceuticals), which combines moxifloxacin, triamcinolone, and vancomycin.

Tri-Moxi and Tri-Moxi-Vanc are injected directly behind the IOL, through the zonules and into the vitreous cavity (Figure). Some eye care providers believe that this technique could be superior to injection into the anterior chamber because many intraocular infections begin in the vitreous, not the anterior chamber. Not only do these drugs help to prevent infections, they also help control postoperative inflammation and protect against surgically induced CME. It is feasible that, with the use of one intraoperative injection, patients would no longer need postoperative eye drops or, depending on surgeon preference, an NSAID alone could be prescribed postoperatively.

FOUR ADVANTAGES

Recently, at our center, we have begun offering Tri-Moxi-Vanc to all of our patients preparing to undergo cataract surgery. We explain that there are four major reasons for a patient to choose the intraoperative injection: First is cost-effectiveness, as the patient is responsible only for the cost of the NSAID if one is prescribed. Depending on the patient’s insurance coverage, this may reduce the cost of postoperative drops for some patients by a few hundred dollars. The second advantage is convenience. Patients do not have to put multiple drops in their eyes after cataract surgery. Third, compliance is better, as the antibiotic and steroid are already in the eye. The fourth advantage is for the eye care provider, who does not have to worry about patients forgetting to use their drops or missing their eye when instilling the drops.

The Tri-Moxi-Vanc medication is a viscous substance, which can make the patient’s vision blurry in the first 48 hours after it is injected. A second common postoperative nuisance can be the appearance of floaters or a dark shadow immediately after the injection and up to 48 to 72 hours postoperatively. Finally, there is a small chance that the Tri-Moxi-Vanc injection can pass through the pupil and settle into the anterior chamber, giving the appearance of a hypopyon, a sign of endophthalmitis. The key difference is that an eye with endophthalmitis will be red and painful. If it is just the medication in the anterior chamber, the eye will be quiet and painless. These minor, short-lived issues do not outweigh the benefits of reducing the burden of medications after cataract surgery.

Common concerns regarding the use of an intravitreal injection of antibiotics and steroid include the risk of intraocular pressure spikes and the efficacy of controlling surgically induced inflammation and CME. A retrospective study of 1,575 eyes that received Tri-Moxi found that the mean intraocular pressure was 21.8 mm Hg on the day of surgery and 14.5 mm Hg at 3 weeks postoperatively. No eyes required ocular hypotensive treatment due to a steroid response. The rate of CME in this study was 2%, but only 1.5% in patients without the risk factors of diabetes or epiretinal membranes. The inflammation rate was 2.5% postoperatively, and in those eyes, the use of topical steroids was required to reduce the inflammation.

CONCLUSION

Eye care providers in the United States now have the opportunity to offer an intraoperative injection that can reduce the risk of infection and help control postoperative inflammation after cataract surgery. Added benefits include convenience and reduced cost for patients and improved compliance to ease the eye care provider’s concerns. In our experience, intravitreal injections have been effective, safe, and ultimately beneficial for our patients.


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