

Preventing Endophthalmitis With Advanced Antibiotic Therapy

New ideas for preventing postsurgical eye infections.

BY JOHN R. WITTPENN JR, MD

Endophthalmitis is a devastating complication for both the patient and the ophthalmologist. Fortunately, the incidence of endophthalmitis is low. Nevertheless, it is incumbent on all surgeons to remain vigilant in measures that may further reduce the risk of this devastating complication.

STERILIZING THE OCULAR SURFACE

Studies dating back to the 1970s show that the preoperative use of antibiotics minimizes the occurrence of endophthalmitis. Allen and Mangiaracine found that the preoperative administration of chloramphenicol and gentamycin reduced the rate of endophthalmitis,¹ and a 1991 study revealed that the use of povidone-iodine also lowered the incidence of this complication.² Therefore, using povidone-iodine along with an antibiotic before surgery has become an accepted standard of care. The duration of treatment remains uncertain, with surgeons debating whether antibiotics should be administered starting 1 or 2 days preoperatively or on the day of surgery and continuing for a week or longer.

STERILIZING THE LID FLORA

The goal of preoperative preparation is to sterilize the ocular surface and the eye lids. Studies have shown that 92% of all cases of endophthalmitis arise from the patient's own lid flora. Research has also found that modern fluoroquinolones like Vigamox (Alcon Laboratories, Inc.), Zymar (Allergan, Inc.), Besivance (Bausch + Lomb), and Iquix (Vistakon Pharmaceuticals,

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LLC) reduced infections in the ocular flora.^{3,4}

In a 2004 study, Bucci showed that treating the lid flora by scrubbing the eye lid with EyeScrub (Novartis Ophthalmics, Inc., Duluth, GA) effectively reduced bacterial cultures from the conjunctiva taken just before cataract surgery.⁴ AzaSite (Inspire Pharmaceuticals, Inc.) delivers high levels of the antibiotic to the lid and maintains those levels for an extended period of time. Combining lid scrubs with this new antibiotic is an effective method for reducing lid flora and should be considered for treating patients with active blepharitis prior to cataract surgery.

INTRACAMERAL ANTIBIOTICS

Researchers from the European Society of Cataract & Refractive Surgeons (ESCRS) found that intracameral cefuroxime administered at the time of surgery significantly reduces the risk of endophthalmitis after cataract surgery when compared with patients who received only topical antibiotics.⁵ Moshirfar et al conducted a study of endophthalmitis rates in 22,276 patients over a 10-year

period. The patients received either Zymar or Vigamox for 3 days preoperatively and then underwent uncomplicated clear corneal cataract surgery. They continued the antibiotic for 7 days after surgery.⁶ The Zymar group was statistically significantly less likely to develop endophthalmitis while on the antibiotic than the Vigamox group ($P = 0.04$). The rate of endophthalmitis in the Zymar group was equivalent to the rate of endophthalmitis in the group in the ESCRS study that received intracameral cefuroxime, so the additional benefit of intracameral antibiotics on US patients is still unclear. The US patients received fourth-generation fluoroquinolones whereas the ESCRS patients did not have these newer agents available. Also, all patients in the ESCRS study were patched until the next morning, which delayed the initiation of topical antibiotic therapy after surgery. The US patients all commenced the postoperative topical antibiotic on the same day as surgery.^{5,6}

In their study of a 4-year period involving 9,079 phaco procedures, Jensen et al reported 26 cases of bacterial postoperative endophthalmitis. They found that the use of an eye patch during the first 18 to 24 hours after surgery increased the endophthalmitis risk ratio 14-fold.⁷ Again, it is important to note that, in the ESCRS study, all of the patients were patched, which may have resulted in the higher rates of endophthalmitis in those patients that did not receive intracameral antibiotics when compared with studies in the United States.

Based on the results of the study by Jensen et al,⁷ my patients resume topical antibiotics on the day of surgery. I patch their eyes for 2 hours to allow them to rest and to permit the anesthetic effects to wane. Next, I have them remove the patch and begin administering topical antibiotics every 2 hours until bedtime. I see them on the day after surgery and have them continue using the antibiotic four times a day until the cataract wound is sealed. I believe the initiation of a broad-spectrum fourth-generation fluoroquinolone with rapid surface kill and good penetration into the aqueous achieves a very similar effect as the intracameral antibiotic used in the ESCRS study. Also, this process does not introduce the additional risk of toxic anterior segment syndrome or drug toxicity.

PREVENTING THE INTRODUCTION OF BUGS

A major concern after cataract surgery is the introduction of bugs from the ocular surface into the eye. West et al conducted a study showing that a definite increase in endophthalmitis rates between the early and late 1990s directly corresponded with cataract surgeons' widespread adoption of clear corneal incisions.⁸ A separate study of cadaver eyes revealed that, whenever the

IOP drops below 12 mm Hg, clear corneal incisions are capable of pulling material from the ocular surface into the eye. Until clear corneal incisions are fully healed, bacteria can enter the eye.⁹ Therefore, I recommend extending the use of a rapid-killing, broad-spectrum topical antibiotic such as Zymar or Besivance for at least 14 days when a clear corneal incision has been utilized.

WHEN DOES ENDOPTHALMITIS TAKE PLACE?

It is often thought that the pathogen causing the endophthalmitis enters the eye at the time of surgery. An increasing number of studies have strongly suggested that the pathogen can enter the eye many days after surgery. A study published in *Ophthalmology* showed that the average time to presentation of endophthalmitis was 9.3 days after surgery rather than 2 to 4 days.¹⁰ Another study showed that the average duration from surgery to the development of endophthalmitis was 6.9 days.¹¹ This research indicates that endophthalmitis—particularly in eyes with clear corneal incisions—can occur much later than has been traditionally thought. The ocular surface should therefore be treated with a broad-spectrum topical antibiotic until it has fully healed.

USING FOURTH-GENERATION FLUOROQUINOLONES

Fourth-generation fluoroquinolones like Zymar and Besivance offer exceptionally broad coverage, because they are mixed with benzalkonium chloride (BAK). The presence of this preservative results in much more rapid killing and a significant lowering of minimum inhibitory concentration (MIC) in otherwise resistant organisms.¹² Besivance does not penetrate the eye as well as Zymar and Vigamox, but it offers the best surface kill because it has a higher concentration of the antibiotic combined with BAK. Vigamox has the best penetration into the anterior chamber but a slower speed of kill and higher MICs in resistant organisms because it lacks BAK. Zymar has good penetration and rapid surface kill and good MICs against resistant organisms because of the BAK.

PREVENTING METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a growing problem. Ophthalmologists are seeing more and more cases of community-acquired MRSA, which presents an increasing risk of endophthalmitis. Investigators at the Charles T. Campbell Eye Microbiology Lab at the University of Pittsburgh reported that 30% to 40% of endophthalmitis cases are MRSA.¹³ When operating on patients with known

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MRSA, ophthalmologists may want to consider referring them to an infectious disease specialist in case Zyvox (Pfizer Inc.) should be prescribed.

CONCLUSION

Surgeons must strive to reduce the risk of endophthalmitis in all patients undergoing cataract surgery. Awareness of trends in the development of the disease and consideration of therapeutic regimes to minimize risk remain paramount. ■

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