Prevention of Endophthalmitis

With proper draping, chemoprophylaxis, wound construction, and patients' education, the rate of endophthalmitis can be kept low.

BY VICTOR CHANG, MD, AND TERRY KIM, MD

ndophthalmitis is an uncommon complication of cataract surgery, with rates ranging from 0.07% to 0.13%, and more recently as high as 0.38%, as reported in a multicenter ESCRS study.¹⁻³ Because of the devastating nature of endophthalmitis, pre-, peri-, and postoperative measures must be taken to minimize risk.

There are various putative approaches to endophthalmitis prophylaxis during cataract surgery. These methods include chemoprophylaxis, surgical draping, wound construction, and antibiotics. Studies examining the efficacy of each technique often produce widely ranging results due to the design of the investigation. Because of this uncertainty, surgical planning is based not only on the evidence of endophthalmitis prevention, but also the safety and cost effectiveness of the techniques reducing infective risk.

COMMON CAUSES

The most common organisms causing endophthalmitis are gram-positive bacteria, with coagulase-negative *Staphylococcus* comprising the majority of cases. In cataract surgery, the most likely sources of infection are the eyelids, eyelashes, and conjunctiva. With this knowledge, skin and lash preparation with povidone-iodine 10%, and cornea and conjunctival sac preparation with a 5% solution for a minimum of 3 minutes have become widely adopted measures in endophthalmitis prophylaxis. The strength of the data supporting surface preparation by this method is considered relatively high compared with other prophylactic techniques.^{4,5}

Because the skin and lashes are likely sources of endophthalmitis, preoperative treatment of blepharitis and proper surgical draping are important considerations. Patients with blepharitis should be instructed to apply warm compresses and perform lid scrubs at least twice daily for 2 weeks prior to surgery. Topical antibiotics such as azithromycin ophthalmic solution 1% "When performing surgical draping, eyelashes should be completely covered to minimize contamination of the wound with eyelid flora."

(AzaSite; Inspire Pharmaceuticals, Inc.) rubbed onto the lids/lashes once daily may also be considered. When performing surgical draping, eyelashes should be completely covered to minimize contamination of the wound with eyelid flora.

TOPICAL ANTIBIOTICS

Although there is a lack of evidence supporting the use of perioperative topical antibiotics, it has become a commonly performed measure for endophthalmitis prophylaxis. Fourth-generation fluoroquinolones, such as moxifloxacin (Vigamox and Moxeza; Alcon Laboratories, Inc.) and gatifloxacin (Zymar and Zymaxid; Allergan, Inc.), have become preferred choices due to their broad spectrum of coverage and excellent penetration and tolerability profile.⁶

WOUND CONSTRUCTION

Self-sealing clear corneal wounds are favored over sutured wounds, because the former are associated with greater comfort for patients, minimal induced astigmatism, and faster visual rehabilitation. Although the relationship between self-sealing corneal incisions and the increased risk of endophthalmitis remains uncertain, there is a general consensus that proper wound architecture can help to minimize the risk of infection.

Transient fluctuations in IOP can cause the wound to gape, allowing an influx of ocular surface fluid along

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with microorganisms. Paul Ernest, MD, has shown that properly constructed square corneal incisions resist this tendency to gape and self-seal more effectively.⁷ These wounds have also been shown by optical coherence tomography to provide advantageous architecture by self-sealing.⁸

When the potential for fluctuations in IOP is present, as with poorly constructed or damaged wounds or in patients who have had filtering procedures for glaucoma, the wound must be closed by suture or possibly adhesive.

OPHTHALMIC ADHESIVES

Recent studies involving a novel class of ophthalmic adhesives known as *biodendrimers* have demonstrated effective sealing of clear corneal incisions. Biodendrimer adhesives polymerize to form a smooth hydrogel surface over the cornea, providing a comfortable yet strong barrier. The leaking pressure of wounds sealed with a biodendrimer adhesive has been shown to be significantly higher than that of unsealed wounds in the human donor corneal model (142 mm Hg vs 78 mm Hg, respectively).⁹ Because forceful eyelid squeezing can raise IOP to nearly 90 mm Hg,¹⁰ biodendrimer adhesives may be a welcome alternative to sutures when commercially available.

ANTIBIOTICS

For the past few years, studies have supported the use of intracameral antibiotics in endophthalmitis prophylaxis. Recently, a prospective randomized multicenter ESCRS study using intracameral cefuroxime demonstrated a five- to sixfold increase in the risk for endophthalmitis when the intracameral antibiotic was not used.¹¹ Although the intracameral administration of antibiotics has yet to be widely adopted in the United States, it may be more strongly recommended in the future. Further analysis must be made on the safety, cost-effectiveness, and type of intracameral antibiotics used.

During the postoperative period, patients should be instructed to instill a topical antibiotic until the epithelium is healed. Fluoroquinolones have become the topical antibiotic of choice in the United States. They have been shown to have a wide safety margin, good tissue penetration, rapid bactericidal effect, and a broad spectrum of coverage, particularly fourth-generation fluoroquinolones like those previously mentioned.^{6,12}

CONCLUSION

Because of the potentially devastating effect of postoperative endophthalmitis, the cataract surgeon must have a thoughtful plan to minimize this risk. With proper draping, chemoprophylaxis, wound construction, and patient education, the rate of endophthalmitis can be kept low. Future studies involving intracameral antibiotics and wound adhesives may provide additional techniques to lower the rates of postoperative endophthalmitis even further.

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