Intracameral Vancomycin: Rationale and Experience

During routine cataract surgery, injecting vancomycin in the bag, underneath the IOL, appears to help safely and effectively prevent endophthalmitis following cataract surgery.

BY HOWARD V. GIMBEL, MD, MPH, FRCSC

The prevention of endophthalmitis has been the impetus for many innovations in cataract surgery. Although used for more than a decade, intracameral vancomycin for the prophylaxis of postoperative endophthalmitis is challenged by the drug’s limited spectrum of activity and pharmacodynamics. Fourth-generation fluoroquinolones may be more effective against both gram-positive and gram-negative bacteria, and their intracameral safety is now being established. This article describes the results my colleagues and I have obtained with the routine, in-the-bag injection of vancomycin for preventing endophthalmitis in 36,047 consecutive eyes over a 16-year period. We previously reported early data and established this strategy’s safety regarding corneal toxicity.

PERSONAL EXPERIENCE

James Gills, MD, of Tarpon Springs, Florida, began using vancomycin in irrigating solutions in 1987 (a practice we followed in 1988), and his incidence of endophthalmitis dropped from 0.2% to 0.01%.

In 1990, we started using a therapeutic dose of vancomycin as a concentrated bolus (1 mg of vancomycin in 0.1 mL of balanced salt solution [BSS; Alcon Laboratories, Inc., Fort Worth, TX]) injected under the IOL and into the capsular bag at the end of the case rather than a more dilute solution continuously infused in the irrigating solution. My reasoning was that infection was most likely to start in the aqueous fluid that the IOL sequesters in the bag and that, if the drug were placed in that location, it would not wash out as quickly as it would from the anterior chamber.

I placed incisions on the steep meridian, so there was a mixture of superior scleral tunnel incisions under a limbus-based conjunctival flap and temporal clear corneal incisions. I sutured fewer than 0.5% of the incisions. I started patients on Maxidex or Tobradex (both from Alcon Laboratories, Inc.) drops q.i.d. 1 day preoperatively and had them continue the drops immediately after surgery.

RESULTS

With Garamycin (Schering-Plough Corporation, Kenilworth, NJ) in the irrigating solution (1985 to 1987), the year-to-year incidence of endophthalmitis at the Gimbel Eye
Centre in Calgary, Alberta, Canada, ranged from 0.02% to 0.15%. This rate remained relatively unchanged after we replaced vancomycin with Garamycin in the irrigating solution (1988 to 1989) (Figure 1).

In a series of 36,047 consecutive eyes from 1990 through 2006 in which we placed vancomycin as a bolus under the IOL, three eyes developed what was probably toxic endophthalmitis (Figure 2). These patients presented with anterior chamber fibrin but without pain on the first postoperative day. We managed the eyes aggressively with anterior vitrectomy through a posterior capsular capsulorhexis using the original cataract incision and an intravitreal injection of vancomycin 1 mg in 1 mL of BSS. All three eyes were culture negative and regained a BCVA of 20/20.

A fourth eye developed anterior segment inflammation and pain on the second postoperative day, although there was no hypopyon or fibrin. Conservative therapy achieved initial improvement, but then the eye developed a fibrinous veil. It was not managed with the anterior vitrectomy approach like the other three cases. On day 7, the patient was referred to a retinal specialist who, on the eighth day, performed an anterior chamber tap and injected an antibiotic. Visual acuity improved to 20/40, but the recovery was unsatisfactory. Pars plana vitrectomy and antibiotic injection were therefore performed on the 10th postoperative day. The patient’s visual acuity 8 weeks later was 20/25. Although cultures were all negative, this case was most likely a low-grade infectious endophthalmitis (Table 1).

Considering all four of these cases, although the first three presented as toxic endophthalmitis, the incidence in this series (at one center) is 4:36,047 or 0.011%.

**DISCUSSION**

Most anterior segment ophthalmologists use broad-spectrum antibiotics either subconjunctivally or intracamerally during surgery. Both in vivo and in vitro studies have shown intracameral vancomycin to be effective for endophthalmitis prophylaxis.4-8 A number of investigators have suggested that vancomycin used intracamerally can significantly reduce the risk of endophthalmitis.9-16 A survey conducted by the ASCRS showed that at least 35% of ophthalmic surgeons were using intracameral antibiotics.17 Of the surgeons surveyed, 80% used vancomycin, and more than 40% used gentamicin.

The AAO-CDC Task Force on Vancomycin Prophylaxis in Ophthalmic Surgery recommends the prudent use of vancomycin in routine cataract surgery because of the potential for resistance to the drug and the lack of evidence for its effectiveness in preventing postoperative endophthalmitis.18 Recent in vivo and in vitro studies, however, have shown that

![Figure 2. This graph shows the incidence of endophthalmitis (0.01%) in 36,047 consecutive eyes from 1990 to 2006 using intracameral vancomycin as a bolus under the IOL.](image)

**TABLE 1. CASE SUMMARIES OF ENDOPTHALMITIS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Incision</th>
<th>IOL/OVD</th>
<th>1 Day Postoperatively</th>
<th>Treatment</th>
<th>BCVA</th>
<th>Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>Scleral 5.5 mm</td>
<td>812A/ Healon GV</td>
<td>4+ cell and flare Hypopyon cell and flare</td>
<td>Posterior continuous curvilinear capsulorhexis Anterior vitrectomy antibiotics</td>
<td>6 days 20/20</td>
<td>Negative</td>
</tr>
<tr>
<td>1995</td>
<td>Clear corneal 3.2 mm</td>
<td>SI30NB/ Healon GV</td>
<td>4+ cell and flare Hypopyon cell and flare</td>
<td>Posterior continuous curvilinear capsulorhexis Anterior vitrectomy antibiotics</td>
<td>5 weeks 20/20</td>
<td>Negative</td>
</tr>
<tr>
<td>1995</td>
<td>Clear corneal 3.2 mm</td>
<td>SI30NB/ Healon GV</td>
<td>4+ cell and flare Hypopyon cell and flare</td>
<td>Posterior continuous curvilinear capsulorhexis Anterior vitrectomy antibiotics</td>
<td>7 weeks 20/20</td>
<td>Negative</td>
</tr>
<tr>
<td>2005</td>
<td>Clear corneal 3.2 mm</td>
<td>SA60AT/ Healon 5</td>
<td>8 days postoperatively 4+ cell and flare Hypopyon cell and flare</td>
<td>Anterior chamber tap Pars plana vitrectomy antibiotics</td>
<td>8 weeks 20/25</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Note: The 812A lens (Pfizer, Inc., New York, NY); Healon GV, Healon 5, and the SI30NB lens (Advanced Medical Optics, Inc., Santa Ana, CA); the SA60AT lens (Alcon Laboratories, Inc., Fort Worth, TX).
The incidence of endophthalmitis after cataract surgery is lower in diabetic patients.16,17 This may be due to an alteration in the microbiology of the anterior chamber, where the optimal conditions for bacterial growth are created.18,19 Although the incidence of endophthalmitis is low, the consequences of this infection can be severe, including loss of vision and the need for additional surgery.20

Another factor to consider relates to our center’s preoperative protocol. Whether diabetic or not, we ask our patients to minimize or eliminate their intake of simple sugars for a few days before and after surgery. The Endophthalmitis Vitrectomy Study found that diabetics tend to have more virulent organisms, to have a higher percentage of gram-negative isolates, and to be culture negative less often.20

Although newer broad-spectrum drugs will probably become more commonly used intracamerally than vancomycin, there is little motivation for us to change protocols or drugs when we have not lost an eye or had patients lose vision to less than 20/25 due to infectious or toxic endophthalmitis in 36,047 cataract surgeries.21

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Figure 3. The surgeon injects vancomycin into the bag, under the IOL.

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