American Academy of Ophthalmology
The Eye M.D. Association

Endophthalmitis Occurring after Cataract Surgery

Outcomes of More Than 480 000 Cataract Surgeries, Epidemiologic Features, and Risk Factors

Mahmoud Jabbarvand, MD,[1] *Hesam Hashemian, MD,*[1] *Mehdi Khodaparast, MD,*[1] *Mohammadkarim Jouhari, MD,*[1] *Ali Tabatabaei, MD,*[1] *Shadi Rezaei, BSC*[2]

Purpose: To report the incidence of endophthalmitis after senile cataract surgery and to describe the epidemiology and main risk factors.

Design: Retrospective, single-center, cross-sectional descriptive study.

Participants: Patients who underwent cataract surgery in Farabi Eye Hospital from 2006 through 2014.

Methods: All patients were evaluated retrospectively to compare risk factors, epidemiologic factors, and prophylaxis methods related to endophthalmitis. Patient records were used to gather the data.

Main Outcome Measures: Epidemiologic factors, systemic diseases, other ocular pathologic characteristics, complications during the surgery, technique of cataract surgery, intraocular lens type, method of antibiotic prophylaxis, surgeon experience, vitreous culture, and vision outcome were evaluated in these patients.

Results: One hundred twelve endophthalmitis cases among 480 104 operations reported, equaling an incidence of 0.023%. Patients with diabetes mellitus (14.3%) and of older age (mean age, 81 years), perioperative communication with the vitreous (17.9%), extracapsular cataract surgery procedure (11%), and surgery on the left eye (58.9% vs. 41.1% for right eye; $P = 0.03$) showed a statistically significant association with endophthalmitis. Short-term treatment with topical or systemic preoperative antibiotics or postoperative subconjunctival injection was associated with a 40% to 50% reduced odds of endophthalmitis compared with no prophylaxis ($P = 0.2$). No cases of endophthalmitis were observed among the 25 920 patients who received intracameral cefuroxime, suggesting that this approach to antibiotic prophylaxis may be far more effective than traditional topical or subconjunctival approaches.

Conclusions: The incidence of endophthalmitis after cataract surgery in our center was 0.023%, comparable with that of other previously published international studies. Older rural patients with immune suppressive diseases, such as diabetes mellitus, are particularly more prone to endophthalmitis. Vitreous loss at the time of surgery was associated with a significantly increased risk. Whereas antibiotic prophylaxis overall showed a 40% to 50% reduction in risk, intracameral cefuroxime was 100% effective in preventing endophthalmitis in this series. *Ophthalmology 2015;■:1–7 © 2015 by the American Academy of Ophthalmology.*

Cataract surgery is by far the most common ocular surgery performed worldwide. Postoperative endophthalmitis is a rare—but disastrous—complication of cataract surgery, with a reported incidence of 0.04% to 0.41%.[1] Although it is not prevalent, it presents an important public health problem. The worldwide aging population likely will result in a higher rate of cataract surgeries in the near future.

Postoperative endophthalmitis often is associated with serious morbidity and high medical care expenses. Visual outcomes after endophthalmitis often are poor: one third of individuals do not gain vision better than counting fingers, and 50% do not recover vision better than 20/40.[2] In some cases, even anatomic distortion of the globe occurs.

In recent years, cataract surgery technique has improved progressively with the use of injectable lenses and topical anesthesia, microincisions, and sutureless surgical wounds. All of these changes may have reduced the rate of postoperative endophthalmitis. So, it is useful to analyze epidemiologic data and the epidemiologic factors associated with surgical infection to prevent its appearance and consequences.

The objective of this study was to evaluate the effect of epidemiologic and surgical factors on endophthalmitis occurring after cataract surgery and to assess prophylaxis techniques, treatment methods, and outcomes in a referral center in Iran. One of the advantages of this study in comparison with previous reports is its single-center nature, which may decrease some confounding factors.

http://dx.doi.org/10.1016/j.ophtha.2015.08.023
ISSN 0161-6420/15

Methods

We retrospectively analyzed the electronic medical records of 480 104 eyes of patients who had undergone senile cataract surgery at Farabi Eye Hospital, Tehran, Iran, from 2006 through 2014. The Farabi Eye Hospital Institutional Review Board approved the study protocol. We identified all cases of endophthalmitis occurring after cataract surgery within this interval. We reexamined the patients who had endophthalmitis and evaluated their risk factors and their final visual results.

The diagnosis of endophthalmitis was based on clinical examination indicating an inflammatory reaction out of proportion to the surgical trauma during the normal course of postoperative care, warranting intraocular sampling for bacterial culture. All the patients with a diagnosis code for endophthalmitis using the International Classification of Diseases, Ninth Revision, Clinical Modification codes or similar codes in older records were considered as endophthalmitis: 360.00, purulent endophthalmitis, unspecified; 360.01, acute endophthalmitis; 360.02, panophthalmitis; 360.03, chronic endophthalmitis; and 360.04, vitreous abscess.[3]

We retrospectively evaluated the following variables between the cases and the entire study population: demographic factors, systemic diseases, prophylactic antibiotic regimen (preoperative, intraoperative, or postoperative antibiotics), bacterial species of infection, management of the endophthalmitis, experience level of the cataract surgeon, patient socioeconomic status, method of surgery, intraoperative complications, and final visual acuity.

When endophthalmitis was suspected, a vitreous biopsy was performed immediately and sent to the microbiological laboratory for smear and culture and antibiogram analyses. Endophthalmitis was managed according to the recommendations of the Endophthalmitis Vitrectomy Study.[4]

According to an antibiotic protocol for cataract surgery in Farabi Eye Hospital, which is followed by all ophthalmologists, all patients received 5% povidone−iodine for 5 minutes before surgery. At the time of discharge, the patients were prescribed a topical antibiotic−corticosteroid solution (betamethasone 0.1% combined with either ciprofloxacin 0.3% or chloramphenicol 0.5%) in tapering dosages during a 45-day postoperative period. Records were excluded if data indicated the eye had undergone previous intraocular surgery.

Based on the level of surgeon experience, surgeries were classified as performed by full-time attending or in-training surgeons. Analysis of the latter group's records was carried out depending on whether the surgeon was a resident or fellow. Full-time attending physicians performed 72% of surgeries.

Statistical Analysis

All statistical analyses were performed using SPSS software (SPSS, Inc., Chicago, IL). Means and standard deviations of quantitative variables and distribution of frequencies of qualitative variables were studied. A Pearson chi-square test and an independent sample test were used for risk factors analysis. P values less than 0.05 were considered statistically significant. Multivariate logistic regression analysis was performed to evaluate diabetes, vitreous loss, and antibiotic prophylaxis as independent risk factors for endophthalmitis.

Results

Analysis of medical records revealed 112 endophthalmitis cases among 480 104 operations, indicating a postoperative endophthalmitis incidence of 0.023%. The mean age±standard deviation of the entire cataract surgery population was 79±9.5 years. Endophthalmitis developed in patients with a mean age ± standard deviation of 81±7.8 years. Table 1 shows the summary of clinical findings and specifications of patients with endophthalmitis.

The average period between surgery and the diagnosis of endophthalmitis was 8 days. One hundred cases (89%) were diagnosed with acute-onset endophthalmitis (within 6 weeks of surgery) and 12 eyes (11%) had late-onset endophthalmitis (>6 weeks from the time of surgery).

The cataract surgery technique was reported in all cases. In approximately 98.3% of the entire study population, phacoemulsification surgery was performed with a clear corneal 3.2-mm incision. Endophthalmitis occurred in 100 eyes (89%) after phacoemulsification and in 12 eyes (11%) after extracapsular cataract extraction. Nearly one-fifth of postcataract surgery endophthalmitis cases (17.9%) had experienced posterior capsule rupture and vitreous loss in the initial cataract surgery. Table 2 shows the distribution of cataract surgery techniques performed and the incidence of vitreous loss. A higher incidence of endophthalmitis was present in the extracapsular cataract extraction ($P = 0.006$), vitreous loss, and diabetic groups. Of all the patients who underwent cataract surgery, 5.4% were diabetic, whereas 16 of 112 endophthalmitis cases (14.3%) occurred in patients with diabetes mellitus ($P = 0.004$).

Multivariate logistic regression analysis demonstrated that diabetes ($P = 0.018$) and vitreous loss ($P < 0.001$) were independent risk factors for endophthalmitis. We observed a 7-fold and 3-fold increase in the rate of endophthalmitis among those with vitreous loss and diabetes, respectively (odds ratios, 7.83 and 2.92, respectively, for vitreous loss and diabetes).

Among the 112 cases of endophthalmitis, 4 cases (3.6%) were aphakic, 34 of the implanted lenses were hydrophobic (30.4%), and 74 lenses were hydrophilic (66%). Among the entire cataract surgery population, 42.4% had hydrophobic lenses and 57.6% had hydrophilic lenses.

A total of 15.3% of patients received preoperative antibiotic eye drops (ciprofloxacin 0.3%). Intracameral cefuroxime was used at the end of cataract surgery in 25 920 patients (5.4%); endophthalmitis did not develop in any of these patients ($P = 0.0001$). Table 3 shows the single risk factor analysis for prophylaxis antibiotic usage. Single-variable analyses showed that the use of intracameral antibiotics was the decisive prophylactic factor for the development of postoperative endophthalmitis.

Among all vitreous samples obtained from endophthalmitis cases, 41 samples (36.6%) showed positive culture results; the

Table 1. Summary of Demographic Data of All Endophthalmitis Cases

Gender	
Male	52 (46.4)
Female	60 (53.6)
Affected eye	
Right	46 (41.1)
Left	66 (58.9)
Diabetes	16 (14.3)
Lacrimal drainage disease	16 (14.3)
Vitreous loss	20 (17.9)
Location	
Rural	28 (25)
Urban	84 (75)

Data are no. (%).