

Endophthalmitis After Cataract Extraction: Incidence, Treatment, and Outcome in Crete, Greece, During Period 2000–2008

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ABSTRACT

Purpose: To report the incidence, microbial spectrum, and outcome of cataract operation related endophthalmitis cases from 2000 to 2008 in the Department of Ophthalmology, University Hospital of Heraklion, Crete.

Methods: Retrospective, observational case series collected from the files of the University Eye Clinic of Heraklion.

Results: From 2000 to 2008, 23 eyes of 23 patients with endophthalmitis after cataract surgery were reported. Vitreous specimens were obtained in all cases. Twelve were cultured positive, 8 with gram-positive bacteria, and 4 with gram-negative bacteria. Ten patients were treated medically, 13 surgically, and 2 finally underwent enucleation of the affected globe. Fourteen (60.8%) eyes of the total 23 managed in our hospital, achieved a final visual acuity of 1/10 or better and 9 lower than 1/10. Five eyes ended up with no light perception.

Conclusions: We provide an overview of cataract operation related endophthalmitis cases managed in our clinic during the past 9 years.

KEYWORDS: bacterial endophthalmitis; cataract extraction; incidence; outcome; postoperative endophthalmitis

INTRODUCTION

Endophthalmitis is defined as any inflammation of the internal ocular compartments, but in clinical practice it is limited to inflammation secondary to infection. Although rare, endophthalmitis is a potentially catastrophic intraocular infection resulting in a poor visual prognosis for the majority of patients.¹ Endophthalmitis most commonly occurs as a postoperative complication of cataract surgery and in 70% of cases is caused by coagulase negative staphylococci.² The incidence of postoperative endophthalmitis today ranges from 0.33% down to 0.04%.³

Endophthalmitis remains one of the most devastating complications of ophthalmic surgery for both patients and physicians. Reports on early recognition, diagnostic pearls, incidence rates, and treatment paradigms have consistently been published for many types of postoperative endophthalmitis.^{4–8} Great strides were initially made for postcataract endophthalmitis with the conduction of the prospective Endophthalmitis Vitrectomy Study (EVS) in the 1990s.⁹ Approximately half the patients in that study achieved a visual acuity of 20/40 or better by 9 months after treatment. Although EVS has several limitations, today still represents the main guide for endophthalmitis management.

The present study investigates the incidence, microbial spectrum, and outcome after treatment among patients who were diagnosed with endophthalmitis related to cataract operation at the Eye Clinic of

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University Hospital of Heraklion (ECUHH), a tertiary regional ophthalmological care centre, during the period 2000–2008.

MATERIALS AND METHODS

This is a retrospective study concerning all postcataract operation cases of endophthalmitis diagnosed and treated in the Eye Clinic of the University Hospital of Heraklion, Crete (ECUHHC), from 2000 to 2008. The data were collected from the archives of the hospital and included 23 cases. We included cases where cataract surgery was performed in our hospital and cases that were referred to us from other local hospitals or private eye clinics for management. The investigations were performed according to the guidelines of the Declaration of Helsinki and Institutional Review Board approval was obtained.

All kinds of cataract operation methods were included. Endophthalmitis cases after other surgical procedures, combined procedures, posttraumatic, and endogenous cases were excluded from this study.

Regarding the time of onset, this study included patients with acute (occurring within 6 weeks after surgery) and delayed onset (occurring more than 6 weeks after surgery) of endophthalmitis.

The diagnosis was made clinically based on patients' symptoms and signs. When the diagnosis of endophthalmitis was made, vitreous specimens were obtained in all cases and sent for cultivation in the Microbiological Department of the University Hospital of Crete. The results of the positive cultures and antibiotic sensitivity scores were used for modification of therapy when response to therapy was not optimal. After obtaining vitreous samples, either vitrectomy or repeated intravitreal injections of antibiotics were performed.

Further information taken into consideration in this study was the age of the patients, the gender (male or female), and the Best Corrected Visual Acuity (BCVA) of the subject at first presentation and at the end of the follow-up. Eventually, in order to estimate the conformance of the incidence of postoperative endophthalmitis in our Clinic with the international references, we listed whether the postoperative incidents had the cataract operation performed in the Eye Clinic of The University Hospital of Heraklion or not.

Statistical analysis

Continuous variables were expressed as means \pm standard deviation, while discrete variables were

expressed as counts and proportions. SPSS 15.0 and EXCEL 2003 were used for statistical analysis and graphs creation.

RESULTS

During the years 2000–2008, in ECUHHC, 23 eyes were diagnosed with endophthalmitis in 23 patients (9 males and 14 females). The mean age of the patients was 73 years old (range: 44–96).

From the total 23 postcataract operation endophthalmitis, 7 had their initial surgery performed in ECUHHC, one with extracapsular cataract extraction method and 6 with phacoemulsification. The other 16 were referred to us from other local hospitals or private eye centres and were all phacoemulsification cases.

During the nine-year study period of 2000–2008, a sum of 8393 cataract operations were performed in ECUHHC. A total of 7 eyes of 7 patients developed endophthalmitis. Thus the average 9 years incidence of endophthalmitis in ECUHHC was 0.083%.

Prophylactic treatment for cases performed in ECUHHC, where data are available, included tobramycin drops 3 mg/mL bid the day before surgery and povidone-iodine preparation to the lids, lashes, and conjunctiva in the operating room, at the initiation of the procedure. No antibiotics were used in the infusion fluid or intracamerally during surgery. All patients received a subconjunctival injection of antibiotics at the end of the procedure containing gentamycin.

The diagnosis of endophthalmitis was based on pain, decreased visual acuity and typical clinical features, including lid swelling, conjunctival chemosis, keratic precipitates with hypopyon, and marked intraocular inflammation. The mean duration from the day that cataract surgery was performed to the day of diagnosis with endophthalmitis was 12 days (range: 1–60 days) with the majority (63.6%) presenting within the first week.

In all clinically diagnosed patients, vitreous and/or anterior chamber cultures were obtained, and sent for cultivation in the Microbiological Department of the University Hospital of Crete. Stored bacterial isolates from culture-positive cases were tested in vitro for sensitivity to various antibiotics.

In 12 out of 23 cases positive results were obtained, thus the overall culture positivity rate was 52.17%, whereas the remaining 11 (47.3%) cases resulted negative. Eight of the positive cultures were gram-positive bacteria, with the majority (6) being *Staphylococcus* species, and 4 were gram-negative bacteria.

Patients after culture specimens' acquisition were managed with intravitreal injection of antibiotics

TABLE 1 Data summary

| Patient | Facility performing surgery | Days from surgery | Organism cultured | VA PRE | VA POST | Management | |
|---------|-----------------------------|-------------------|------------------------------------|--------|---------|----------------------|-------------|
| 1 | Other Centre | 60 | None | HM | NLP | Vitrectomy (V,G) | enucleation |
| 2 | ECUHHC | 20 | None | CF | 9/10 | Vitrectomy (V,C) | |
| 3 | Other Centre | 16 | None | LP | LP | Vitrectomy (V,C) | |
| 4 | Other Centre | 3 | <i>Staphylococcus haemolyticus</i> | LP | 8/10 | Tap & inject (V,C,D) | |
| 5 | ECUHHC | 4 | None | HM | 2/10 | Vitrectomy (V,C,D) | |
| 6 | Other Centre | 10 | None | HM | 2/10 | Tap & inject (V,C,D) | |
| 7 | Other Centre | 3 | <i>Serratia marcescens</i> | NLP | NLP | Vitrectomy (V,C) | enucleation |
| 8 | Other Centre | 3 | <i>Escherichia coli</i> | CF | 5/10 | Tap & inject (V,C,D) | |
| 9 | Other Centre | 4 | None | CF | 8/10 | Vitrectomy (V,C) | |
| 10 | ECUHHC | 40 | <i>Staphylococcus epidermidis</i> | LP | LP | Vitrectomy (V,G) | |
| 11 | ECUHHC | 4 | None | CF | 6/10 | Tap & inject (V,C,D) | |
| 12 | ECUHHC | 7 | None | 2/10 | 5/10 | Tap & inject (V,G) | |
| 13 | Other Centre | 8 | None | CF | CF | Vitrectomy (V,C) | |
| 14 | Other Centre | 20 | <i>Streptococcus viridans</i> | HM | NLP | Vitrectomy (V,C) | |
| 15 | Other Centre | 6 | <i>Staphylococcus epidermidis</i> | 4/10 | 4/10 | Tap & inject (V,C) | |
| 16 | Other Centre | 5 | None | CF | 3/10 | Tap & inject (V,C,D) | |
| 17 | Other Centre | 1 | None | CF | 9/10 | Tap & inject (V,C,D) | |
| 18 | Other Centre | 2 | <i>Serratia marcescens</i> | HM | NLP | Vitrectomy (V,C) | |
| 19 | Other Centre | 42 | <i>Staphylococcus epidermidis</i> | 2/10 | 8/10 | Tap & inject (V,C,D) | |
| 20 | Other Centre | 3 | <i>Staphylococcus epidermidis</i> | HM | 7/10 | Vitrectomy (V,C) | |
| 21 | Other Centre | 9 | <i>Pseudomonas aeruginosa</i> | LP | NLP | Vitrectomy (V,C,D) | |
| 22 | ECUHHC | 3 | <i>Streptococcus sanguis</i> | LP | HM | Vitrectomy (V,C) | |
| 23 | ECUHHC | 5 | <i>Staphylococcus epidermidis</i> | HM | 1/10 | Tap & inject (V,C,D) | |

VA:visual acuity; CF: count fingers; HM: hand motion; LP: light perception; NLP: no light perception; V: vancomycin; C: ceftazidime; G:gentamycin; D: dexamethasone.

alone (*tap-inject*) in 10 cases (43.47 %) and *vitrectomy* with intraoperative antibiotic administration in 13 (56.53%) according to treating physician's discretion. The administrated antibiotics were vancomycin 1 mg, combined with either gentamycin 0.1 mg (3 cases) or ceftazidime 2.5 mg (20 cases). Dexamethasone 0.4 mg was administrated in 10 cases.

Overall 14 (60.8%) eyes of the total 23 managed in our hospital, achieved a final visual acuity of 1/10 or better and 9 worst than 1/10. Five eyes ended up with no light perception, two of which were finally enucleated.

Most of the aforementioned data are summarized in Table 1.

TABLE 2 Reported incidence of endophthalmitis after cataract surgery in selected published series

| Location | Duration of study | No. of cases/total | Incidence (%) |
|----------------------------|-------------------|--------------------|---------------|
| Australia ¹⁰ | 1980–1998 | 188/94,653 | 0.20 |
| UK ¹¹ | 10/1999–9/2000 | 196/230,000 | 0.09 |
| UK ¹² | 1991–2001 | 30/18,191 | 0.16 |
| Singapore ¹³ | 1996–2001 | 34/44,803 | 0.08 |
| Japan ¹⁴ | 1998–2001 | 15/12,317 | 0.12 |
| Canada ¹⁵ | 9/1994–1/1998 | 10/13,886 | 0.07 |
| Bascom Palmer ⁵ | 2000–2004 | 7/15,920 | 0.04 |
| Sweden ¹⁶ | 2002–2004 | 109/225471 | 0.04 |
| S. India ¹⁷ | 2002–2003 | 19/36072 | 0.05 |
| Taiwan ¹⁸ | 1991–2004 | 46/21562 | 0.21 |
| USA ⁷ | 1994–2001 | 1026/477627 | 0.215 |
| ECUHHC | 2000–2008 | 7/8393 | 0.083 |

DISCUSSION

The incidence of endophthalmitis occurring in patients initially operated in our hospital for cataract, during the years 2000–2008 was 0.083% (7 out of 8393). This number is very close to the majority of international references and is consistent with that of other large series reported in bibliography, Table 2). The reported incidence of endophthalmitis after cataract surgery varies across studies, depending on factors such as peri-operative prophylactic measures, surgical techniques, intraoperative complications, and postoperative antibiotic regimen. In a systemic review of the literature from 1963 to 2003 Taban et al.³ reported an overall rate of 0.128% for post-cataract endophthalmitis during that period.

In a prospective, randomized, partially masked, multicenter, cataract surgery study, conducted by the European Society of Cataract & Refractive Surgeons (ESCRS) Endophthalmitis Study Group, between 2003 and 2006 and published in 2007, the control group (A) of patients that underwent cataract surgery, without receiving either intracameral cefuroxime or topical levofloxacin drops after the operation, presented an incidence of proven endophthalmitis of 0.247%.¹⁹ This group included approximately 7,000 patients. Both the number of patients and the management after cataract operation were similar to the patients operated for cataract in our clinic. However, the reported incidence of endophthalmitis in this group was approximately three times higher compared to the reported incidence in our clinic.

Final visual outcomes in post-cataract operation endophthalmitis cases were more likely to be favorable, when a gram-positive microorganism was responsible (5 out of 8, 62.5% had final VA $\geq 1/10$), than a gram negative (3 out of 4, 75% end up with NLP). This trend is the same as in the EVS study, where 52% of gram-positive cases ended up with final VA $\geq 20/40$ and 39% of those with a gram-negative microbe implicated.²

For the management of postcataract operation endophthalmitis, we generally followed the guidelines of EVS study, though not under strict protocol. The trend was towards more aggressive treatment with pars plana vitrectomy in cases with hands motion or better vision, according to the treating physician's discretion.

The intravitreal antibiotics that were used showed an agreement with the international trend, with vancomycin being the first choice agent for coverage against gram-positive bacteria, because of the effectiveness and the wide range of action. For coverage against gram-negative species, a substitution of the initially used aminoglycoside gentamycin, with the third generation cephalosporine ceftazimide was recorded in the most recent years, to avoid the possibility of macular ischemia.

In summary, the incidence of endophthalmitis after cataract operation in our hospital was close to the majority of the international references. For the management, we generally followed the guidelines of the EVS study⁹ especially in postcataract operation cases. Final BCVA improved compared to that at first presentation in 14 out of 23 patients and 14 of the patients achieved a final BCVA better than 1/10. The incidence though, could be decreased in the future, with additional precaution measures being adopted by many surgeons, such as the use of intracameral antibiotics like cefuroxime 1 mg in 0.1 mL normal saline added at the end of surgery, which according to the ESCRS group study, reduced the occurrence of postoperative endophthalmitis by almost five times.¹⁹

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