



Review

Post-cataract surgery endophthalmitis: Brief literature review

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Abstract

Purpose: To investigate recent evidence in prophylaxis and management of post-cataract surgery endophthalmitis.

Methods: We conducted a literature search using Pubmed database for post cataract surgery endophthalmitis, and relevant articles were selected from original English papers published since 2015.

Results: Forty-nine articles were published regarding post-cataract surgery endophthalmitis from January 2015 to February 2016. A low incidence of post-cataract surgery endophthalmitis has been reported. A growing number of articles are focusing on preventing endophthalmitis using intracameral antibiotics.

Conclusion: Based on the current evidence, intracameral antibiotics seems to be effective in preventing endophthalmitis after cataract surgery. Copyright © 2016, Iranian Society of Ophthalmology. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Keywords: Endophthalmitis; Microbiology; Risk factors; Post cataract surgery endophthalmitis

Introduction

Endophthalmitis, although rare, is one of the most devastating complications of intraocular surgeries. As cataract surgery consists of a large fraction of ophthalmic operations, the majority of literature reports about the endophthalmitis is centered on cataract surgery.¹ An aging population worldwide necessitates an increase in the number of cataract surgeries, rendering post-cataract surgery endophthalmitis a public health concern.²

High morbidity and subsequent medical care expenses are part of this complication.² Visual outcomes are not often favorable; about 40% of affected patients sustain severe visual

loss (corrected distance visual acuity of less than 20/200), and only one-third of cases reach visual acuity of better than 20/40.³ Evisceration as a last resort has also been employed in the case of endophthalmitis.⁴

The reported rate of post-operative endophthalmitis varies between a range of 0.04%–0.2%.⁵ However, the incidence of post cataract surgery endophthalmitis shows significant changes overtime. By the time of introduction of clear cornea cataract extraction, as opposed to scleral or limbal incisions, an increase in endophthalmitis rate was observed.^{6–8} There are also studies rejecting this hypothesis, with clear corneal technique being even a safer approach.^{9,10}

Methods

We reviewed recent literature using PubMed database to find original English articles with the keywords “endophthalmitis” and “cataract surgery” or “phacoemulsification”. The relevant articles for a comprehensive update were selected with a special focus on those published from January 2015 to February 2016.

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Results

During the recent year, 49 articles were published on this subject. Sixteen articles were relevant for discussion in this review, of which 7 studies were retrospective and 3 of them were prospective. Also 4 case series, one prospective comparative interventional cohort study and one cost-effectiveness analysis were part of included studies. Intracameral antibiotic was the most prevalent subject discussed in these articles.

Pathogen

Numerous fungal and bacterial agents can cause post-cataract surgery endophthalmitis, with gram positive, coagulase-negative *Staphylococci* being the most common. *Staphylococcus aureus* and *Streptococcus* species are often identified as causing factors as well.^{10–13} This observation reflects the fact that aqueous contamination with surface bacterial flora is the main event in pathogenesis of endophthalmitis.¹⁴ However, gram negative bacteria such as *Klebsiella pneumonia* may also be encountered occasionally, especially in Southeast Asia and in the older-age population based on Lundstrom et al's study.¹⁵ *Candida albicans* is the most frequently isolated organism in the fungal category.¹⁶ In recent years, *Enterococci* has emerged as the leading cause, most likely because of its relative resistance to cefuroxime.^{3,17}

Risk factors

Preoperative risk factors

Many conditions have been postulated as risk factors for the occurrence of endophthalmitis.^{18–32} Advanced age (>85 years old), rural residence, male sex, and immunosuppressive states such as diabetes mellitus are proposed as patient-associated factors.^{2,7,8,15,18–20} Performing cataract surgery on the same day rather than one day after admission may be accompanied by a higher risk of endophthalmitis.²¹ In Nam et al's study, the spring season was an independent risk factor for the development of endophthalmitis.²² A systematic review conducted by Cao et al identified age and male gender as the only preoperative risk factors.²³

Intraoperative risk factors

Intracapsular and extracapsular cataract surgery, vitreous loss, and anterior vitrectomy are considered intraoperative risk factors. Silicone and polymethyl methacrylate (PMMA) intraocular lens (IOL) optic material compared to acrylic are associated with higher rates of endophthalmitis. However, the absence of an injector system for these IOLs and the need for a larger incision for non foldable PMMA lens can confound this association.^{10,19} Based on Weston et al's study at 2015, injectable IOL is associated with a lower risk of endophthalmitis in comparison with forceps delivered IOL.²⁴ Concurrent eyelid or lacrimal surgery during the same hospitalization with cataract surgery can increase the risk of endophthalmitis significantly.²⁵

Postoperative risk factors

Limited studies investigated post surgical events affecting the development of endophthalmitis. A number of risk factors have been proposed in control cohort and retrospective studies including starting topical antibiotics the day after surgery instead of the same day as surgery, not patching following surgery, and using older generations of fluoroquinolone antibiotics.^{26–28}

Risk factors associated with postoperative endophthalmitis based on recent investigations is demonstrated in [Table 1](#).

Prophylaxis

The most important guideline on prophylaxis of endophthalmitis is based on the European Society of Cataract & Refractive Surgeons (ESCRS) study. This multicenter clinical trial was conducted on 16,603 patients in 4 arms using perioperative topical antibiotic, intracameral cefuroxime, and placebo.

According to this study, non-use of intracameral antibiotic, surgical complication, clear cornea incision as opposed to scleral tunnel, male gender, and implantation of silicon IOL were associated with a higher risk of endophthalmitis.¹⁹

In recent years, prophylaxis against endophthalmitis has evolved extensively. Suggested preoperative measures include lid hygiene for reduction of conjunctival flora and meticulous surgical prep and drape with topical povidone–iodine.³³ Nentwich et al investigated the role of copious irrigation of periorbital area and conjunctival sac with povidone-iodine in prevention of endophthalmitis, and based on a 19-year institutional experience, an 8-fold decrease in the rate of endophthalmitis was observed.³⁴

The beneficial effects of preoperative lash trimming, saline irrigation, topical antibiotics, and antibiotic-containing irrigating solutions is not clearly established in reducing post operative rates of endophthalmitis.^{10,35–37} However, Sharma et al found that intracameral concentration of moxifloxacin, whether used topically or orally, is sufficient enough for the prevention of proliferation of most bacteria causing endophthalmitis.³⁸ Subconjunctival antibiotics can be effective in minimizing the risk of endophthalmitis.^{10,21} There is growing and compelling evidence supporting use of Intracameral antibiotic as one of the most effective countermeasures.^{2,10,11,39,40} Studies show a 5- to 9-fold decrease in the rate of endophthalmitis via application of intracameral cefuroxime.^{19,41} In addition, the relative low price of cefuroxime makes it cost-effective in preventing endophthalmitis.⁴² Purslow et al also showed that commercially available intracameral cefuroxime, Apropam[®] costs less than the preparation of cefuroxime in hospitals.⁴³

However, in 2015, Sharma et al reported the outcome of a randomized clinical trial regarding the effectiveness of intracameral cefuroxime, and they did not find any statistically significant additional benefit in preventing endophthalmitis.⁴⁴ These findings were clinically significant (the rate of endophthalmitis decreased from 0.155% to 0.108%) and in a larger sample size, they may be statistically significant as well.

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