

THE LITERATURE



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COMPARATIVE EFFECTIVENESS OF ANTIBIOTIC PROPHYLAXIS IN CATARACT SURGERY

Herrinton LJ, Shorstein NH, Paschal JF, et al¹

ABSTRACT

Herrinton and colleagues performed a large, observational, longitudinal cohort study to examine the effect of topical and intracameral antibiotics on endophthalmitis risk after phacoemulsification cataract extraction. The surgeries were performed at 38 surgical centers on members of the Kaiser Permanente California program. The health plan stores data regarding office visits, pharmacy visits, surgery, and laboratory results in the electronic health record. All patients received a topical application of povidone-iodine as preparation before surgery, and surgeons selected their prophylactic route and agent. The study included phacoemulsification assigned Current Procedural Terminology code 66984, including that complicated by posterior capsular rupture (PCR). Combined procedures were excluded. Acute, postoperative, infectious endophthalmitis was defined as occurring after the first postoperative day through the 90th day after phacoemulsification and requiring treatment with intravitreal antibiotics; positive microbiological confirmation was noted but not required.

The study included 315,246 eyes of 204,515 patients who underwent phacoemulsification and 215 cases of endophthalmitis. When adjusted for year of surgery, patient's age, diabetic retinopathy, PCR, and systemic comorbidity (coded using the Charlson Comorbidity Index), the adjusted odds ratio (OR) for the association of endophthalmitis with intracameral injection (with or without topical antibiotics) compared with using a patient-instilled topical agent alone was 0.58 (95% CI, 0.38-0.91). In 4.5% of the cohort, there was no record of dispensing a topical antibiotic or intracameral injection of an antibiotic, and the OR for this group was 1.95 (95% CI, 1.22-3.11) compared to using a topical agent alone. Undergoing surgery in the earlier years of the study, an age of at least 80 years, diabetic retinopathy, and surgeries complicated by PCR were associated with an increased risk of endophthalmitis.

The authors also examined the role of specific antibiotic agents. Compared with using a topical agent alone, the adjusted OR was 0.53 (95% CI, 0.30-0.95) for intracameral cefuroxime and 0.68 (95% CI, 0.36-1.33) for moxifloxacin. In eyes that received a topical antibiotic alone, no significant differences were observed among gatifloxacin, ofloxacin, and polymyxin/trimethoprim (topical moxifloxacin was not on formulary). The OR with

aminoglycoside (neomycin, gentamicin, tobramycin) was elevated (OR, 1.97 [95% CI, 1.17-3.31]) and similar to the subgroup that did not receive antibiotics at all. In the small group of eyes with PCR, the crude incidence of endophthalmitis was 2.40 per 1,000 in those given a topical antibiotic only and 2.48 in those given an intracameral agent with or without a topical antibiotic. The authors could not make clear inferences about the benefit of intracameral antibiotics in this group.

Overall, the authors observed a 0.044% risk of endophthalmitis in the intracameral group and a 0.070% risk of endophthalmitis in the topical group. Additionally, they observed an approximately twofold greater risk of endophthalmitis in the 4.5% of eyes that had no evidence of antibiotic prophylaxis and lack of effectiveness of topical aminoglycosides. No significant differences were detected between intracameral cefuroxime and moxifloxacin or with the addition of a topical agent to eyes receiving an intracameral agent. PCR was associated with a 3.7-fold increase in the risk of endophthalmitis. The authors concluded that an intracameral injection of cefuroxime or moxifloxacin should be used in all phaco procedures.

INCIDENCE OF ACUTE POSTOPERATIVE ENDOPTHALMITIS AFTER CATARACT SURGERY: A NATIONWIDE STUDY IN FRANCE FROM 2005 TO 2014

Creuzot-Garcher C, Benzenine E, Mariet A-S, et al²

ABSTRACT

Creuzot-Garcher and colleagues performed a large, observational, retrospective cohort study to report the incidence of acute postoperative endophthalmitis after cataract surgery in France using the French national administrative database, Programme Medicalise des Systemes d'Information. The database includes all inpatient and outpatient admissions in both private and public health care facilities, and the authors indicated that its use for hospital budget allocation encourages high data quality that is comprehensive and accurate. The study included cataract surgeries corresponding to the code "cataract extraction performed by phacoemulsification with intraocular lens implantation in a capsular bag," and use of the code for intraoperative anterior vitrectomy was noted and employed as a proxy for PCR. Combined procedures were included. Acute postoperative infectious endophthalmitis was identified if the billing code of endophthalmitis was used within 42 days of cataract extraction and based on clinical suspicion alone.

The study included 6,371,242 procedures in 3,983,525 patients who underwent phacoemulsification and 6,668 cases of endophthalmitis. The mean incidence of endophthalmitis was 0.105%, and the overall incidence of endophthalmitis

declined during the 10-year study period from 0.145% to 0.053%. During the same period, use of intracameral antibiotics increased from 0.60% to 80.03%. In univariate and multivariate analyses, intracameral antibiotic injection was associated with a lower risk of acute postoperative endophthalmitis after phacoemulsification (incidence rate ratio 0.53 compared to reference year 2005), whereas intraoperative PCR, combined surgery, and male gender were associated with increased risk. Morbidity associations such as the presence of diabetes were not available in the authors' dataset. Additionally, the antibiotic used for prophylaxis was not known, although the authors suggested that intracameral ready-to-use cefuroxime (Aprokam; Thea Pharmaceuticals; not available in the United States), which was approved in France in September 2012, was likely the agent used between 2012 and 2014 in light of its reported increase in sales during that time. The incidence rate ratio for acute postoperative endophthalmitis was 0.83 for the period preceding Aprokam's approval and 0.45 thereafter. The authors concluded that intracameral antibiotic injection is associated with a lower risk of acute postoperative endophthalmitis.

DISCUSSION

Acute postoperative endophthalmitis is a rare but dreaded complication following cataract extraction that can result in severe vision loss. Encouragingly, several studies, including the two reviewed herein, have observed a decline in the rate over time.¹⁻⁴ With a reported incidence rate between 0.03% and 0.2%,⁵ however, there is further potential to prevent more than 2,000 cases of endophthalmitis among the 3 million cataract surgeries performed annually in the United States.⁶

Whether or not to use intracameral antibiotics as a routine method of acute postoperative endophthalmitis prophylaxis is a question of global interest. The only randomized clinical trial intended to address this question was the landmark European Society of Cataract & Refractive Surgeons' multicenter study, which demonstrated reduced rates of culture-positive endophthalmitis in eyes randomized to the intracameral cefuroxime arms.⁷ The study was limited by design flaws⁸ and significantly higher rates of endophthalmitis in eyes not randomized to the intracameral cefuroxime subgroups compared to rates reported in other studies during the same time.^{9,10}

Subsequent observational series, including the studies by Herrinton et al and Creuzot-Garcher et al, have reported statistically significant associations between intracameral antibiotics and reduced rates of endophthalmitis.^{1,2} Research comparing rates of endophthalmitis among patients who underwent surgery during different times, however, may not properly account for overall improvements in cataract surgery safety such as wound construction and hydration, environmental and equipment cleaning, surgeons' experience, or other unknown factors.¹ Interestingly, after adjusting for intracameral prophylaxis, Herrinton and colleagues still observed a 43% reduced risk of endophthalmitis over their 8-year study period.¹

The studies reviewed herein corroborate previous reports of diabetes mellitus,¹ older age,¹ and PCR^{1,2} as risk factors for

endophthalmitis. Additional research has demonstrated that the infectious organism causing endophthalmitis may vary based on age,¹¹ ethnicity,¹² and PCR,¹¹ suggesting that a particular antibiotic may not be the ideal prophylaxis in every case. Moreover, increasing cognizance of compounding and dilutional errors, awareness of idiopathic side effects and reactions,¹³ the absence of a prepackaged single-use antibiotic labeled for intracameral use in the United States, growing concerns about antibiotic resistance, and increasing emphasis on the appropriate allocation of limited health resources must all be considered when determining whether or not to recommend the universal adoption of routine intracameral prophylaxis.

There is mounting evidence that prophylactic intracameral antibiotics play an important role in preventing acute postoperative endophthalmitis, but the exact nature of that role, including which antibiotic to administer, remains controversial and uncertain. ■

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