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[Intervention Review]

Perioperative antibiotics for prevention of acute endophthalmitis after cataract surgery

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ABSTRACT

Background

Endophthalmitis is a severe inflammation of the anterior or posterior (or both) chambers of the eye that may be sterile or associated with infection. It is a potentially vision-threatening complication of cataract surgery. Prophylactic measures for endophthalmitis are targeted against various sources of infection.

Objectives

To evaluate the effects of perioperative antibiotic prophylaxis for endophthalmitis following cataract surgery compared with no prophylaxis or other form of prophylaxis.

Search methods

We searched CENTRAL (which contains the Cochrane Eyes and Vision Trials Register) (2016, Issue 12), Ovid MEDLINE, Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE Daily (January 1946 to December 2016), Embase (January 1980 to December 2016), Latin American and Caribbean Health Sciences Literature Database (LILACS) (1982 to December 2016), the ISRCTN registry (www.isrctn.com/editAdvancedSearch), ClinicalTrials.gov (www.clinicaltrials.gov), and the World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP) (www.who.int/ictrp/search/en). We used no date or language restrictions in the electronic searches for trials. We last searched the electronic databases on 6 December 2016. We also searched for additional studies that cited any included trials using the Science Citation Index.

Selection criteria

We included randomized controlled trials that enrolled adults undergoing cataract surgery (any method and incision type) for lens opacities due to any origin. We included trials that evaluated preoperative antibiotics, intraoperative (intracameral, subconjunctival or systemic), or postoperative antibiotic prophylaxis for acute endophthalmitis. We excluded studies that evaluated antiseptic preoperative preparations using agents such as povidone iodine or antibiotics for treating acute endophthalmitis after cataract surgery.

Data collection and analysis

Two review authors independently reviewed abstracts and full-text articles for eligibility, assessed the risk of bias for each included study, and abstracted data.

Main results

Five studies met the inclusion criteria for this review, including 101,005 adults and 132 endophthalmitis cases. While the sample size was very large, the heterogeneity of the study designs and modes of antibiotic delivery made it impossible to conduct a formal meta-analysis. Interventions investigated included the utility of adding vancomycin and gentamycin to the irrigating solution compared with standard balanced saline solution irrigation alone, use of intracameral cefuroxime with or without topical levofloxacin perioperatively, periocular penicillin injections and topical chloramphenicol-sulfadimidine drops compared with topical antibiotics alone, and mode of antibiotic delivery (subconjunctival versus retrobulbar injections; fixed versus separate instillation of gatifloxacin and prednisolone). The risk of bias among studies was low to unclear due to information not being reported. We identified one ongoing study.

Two studies compared any antibiotic with no antibiotic. One study, which compared irrigation with antibiotics in balanced salt solution (BSS) versus BSS alone, was not sufficiently powered to detect differences in endophthalmitis between groups (very low-certainty evidence). One study found reduced risk of endophthalmitis when combining intracameral cefuroxime and topical levofloxacin (risk ratio (RR) 0.14, 95% confidence interval (CI) 0.03 to 0.63; 8106 participants; high-certainty evidence) or using intracameral cefuroxime alone (RR 0.21, CI 0.06 to 0.74; 8110 participants; high-certainty evidence) compared with placebo, and an uncertain effect when using topical levofloxacin alone compared with placebo (RR 0.72, CI 0.32 to 1.61; 8103 participants; moderate-certainty evidence).

Two studies found reduced risk of endophthalmitis when combining antibiotic injections during surgery and topical antibiotics compared with topical antibiotics alone (risk ratio (RR) 0.33, 95% confidence interval (CI) 0.12 to 0.92 (periocular penicillin and topical chloramphenicol-sulfadimidine; 6618 participants; moderate-certainty evidence); and RR 0.20, 95% CI 0.04 to 0.91 (intracameral cefuroxime and topical levofloxacin; 8101 participants; high-certainty evidence)).

One study, which compared fixed versus separate instillation of gatifloxacin and prednisolone, was not sufficiently powered to detect differences in endophthalmitis between groups (very low-certainty evidence). Another study found no evidence of a difference in endophthalmitis when comparing subconjunctival versus retrobulbar antibiotic injections (RR 0.85, 95% CI 0.55 to 1.32; 77,015 participants; moderate-certainty evidence).

Two studies reported any visual acuity outcome; one study, which compared fixed versus separate instillation of gatifloxacin and prednisolone, reported only that mean visual acuity was the same for both groups at 20 days postoperation. In the other study, the difference in the proportion of eyes with final visual acuity greater than 20/40 following endophthalmitis between groups receiving intracameral cefuroxime with or without topical levofloxacin compared with no intracameral cefuroxime was uncertain (RR 0.69, 95% CI 0.22 to 2.11; 29 participants; moderate-certainty evidence).

Only one study reported adverse events (1 of 129 eyes had pupillary membrane in front of the intraocular lens and 8 eyes showed posterior capsule opacity). No study reported outcomes related to quality of life or economic outcomes.

Authors' conclusions

Multiple measures for preventing endophthalmitis following cataract surgery have been studied. High-certainty evidence shows that injection with cefuroxime with or without topical levofloxacin lowers the chance of endophthalmitis after surgery, and there is moderate-certainty evidence to suggest that using antibiotic eye drops in addition to antibiotic injection probably lowers the chance of endophthalmitis compared with using injections or eye drops alone. Clinical trials with rare outcomes require very large sample sizes and are quite costly to conduct; thus, it is unlikely that many additional clinical trials will be conducted to evaluate currently available prophylaxis. Practitioners should rely on current evidence to make informed decisions regarding prophylaxis choices.

PLAIN LANGUAGE SUMMARY

Antibiotics at the time of cataract surgery to prevent bacterial infection of the eye

What is the aim of this review?

The aim of this Cochrane Review was to find out if using antibiotics at the time of cataract surgery can prevent bacterial infection of the eye (endophthalmitis) after cataract surgery. Cochrane researchers collected and analyzed all relevant studies to answer this question and found five studies.

Key messages

There is a very small chance of endophthalmitis after cataract surgery. Antibiotics injected into the eye during surgery lower this small chance of infection (high-certainty evidence). Antibiotic injection and antibiotic eye drops given together probably lower the chance of infection compared with using either injection alone or eye drops alone. Information on adverse effects was not provided in most studies.

What was studied in this review?

Perioperative antibiotics for prevention of acute endophthalmitis after cataract surgery (Review)

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Endophthalmitis is a rare, but potentially serious, complication of cataract surgery that may lead to blindness. It is caused by bacteria that enter the eye during surgery or in the first few days after surgery. There are many ways to stop infection during and after surgery, such as using antibiotics at the time of surgery. There are several different types of antibiotic that can be used, and these may be used in different ways (either by injection into the eye, or infusion into the blood, or eye drops) or at different times (before, during, or after surgery).

What are the main results of the review?

Cochrane researchers found five relevant studies. Two studies were conducted in Pakistan, one study in several European countries, one study in Brazil, and one study in Turkey. These studies all looked at different treatments: one study compared four different treatments - antibiotic injection combined with antibiotic eye drops versus antibiotic injection alone versus antibiotic eye drops alone versus placebo eye drops; one study compared combined antibiotic injection and antibiotic eye drops versus antibiotic eye drops alone; one study compared combined antibiotics and steroids versus antibiotics and steroid given individually; one study compared two different locations for the antibiotic eye injection; one study compared adding antibiotics to the sterile fluid used during surgery versus not adding antibiotics to this fluid.

The review shows that:

- Antibiotic injection in the eye (cefuroxime) at the end of surgery lowers the chance of endophthalmitis after surgery (high-certainty evidence).
- Using antibiotic eye drops (either levofloxacin or chloramphenicol) in addition to antibiotic injection (either cefuroxime or penicillin) probably lowers the chance of endophthalmitis compared with using injections or eye drops alone (moderate certainty evidence).
- It is very uncertain whether adding antibiotic to the sterile irrigating fluid used during cataract surgery lowers the chance of endophthalmitis (very low-certainty evidence).
- It is very uncertain if using antibiotics and steroids individually or in combination makes a difference to the chance of developing endophthalmitis (very low-certainty evidence).

How up to date is this review?

Cochrane researchers searched for studies that had been published up to December 2016.