PREOPERATIVE EYE DISINFECTION IN VITRECTOMY SURGERY USING ANTIBIOTIC OR ANTISEPTIC EYEDROPS

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ABSTRACT

Purpose: To determine the efficacy of preoperative eye disinfection by comparing antibiotic and antiseptic eye drops.
Design: Prospective, randomized double-masked comparative study with three study arms: untreated, antibiotic treated and antiseptic treated.
Methods: Patients that were scheduled for vitrectomy were asked to use an antibiotic or antiseptic eye drop 4 times a day, 5 days before the surgery. Conjunctival smear was cultured at the onset of the surgery. Culture results for each study arm were compared .
Results: Comparable results were found in the patients treated with an antibiotic or antiseptic eye drop.
Conclusions: Since an antiseptic eye drop will cause less bacterial resistance than an antibiotic eye drop, and both treatments have a similar antibacterial effect, this study indicates that prophylactic antiseptic eye drops may be preferred over antibiotic treatment, when prophylaxis is needed.

KEY WORDS

Endophthalmitis, hexamedine di-isetionate, preoperative disinfection, vitrectomy

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INTRODUCTION

The incidence of postoperative infection after vitrectomy surgery varies between 0,03% and 0,07% (1,2,3). Endophthalmitis is a rare but devastating complication. It is mostly caused by commensal bacterial flora of the conjunctiva, the eyelids, the nose and the periocular skin (4,5). The most common responsible organisms are *Staphylococcus epidermidis* and other coagulase negative *Staphylococci* (5,6,7). These organisms are able to adhere to foreign bodies, probably by formation of glycohelix bonds (8).

Other pathogenous bacteria include *Corynebacterium* species, *Streptococcus viridans, Staphylococcus aureus, Pseudomonas aeruginosa* and *Streptococcus pneumoniae.*

Preoperative application of antibiotic drops may induce bacterial resistance. Recently, an antiseptic solution of hexamedine di-isetionate 1 mg/ml (Desomedine®, Chauvin, Montpellier, France) became available for preoperative eye disinfection. Using an antiseptic rather than an antibiotic drop may reduce the risk of endophthalmitis without inducing bacterial resistance to antibiotics. The aim of this study was to evaluate the sterilizing effect of hexamedine di-isetionate on the conjunctiva and comparing its effect to a popular antibiotic drug: ofloxacine (Trafloxal®, Tramedico, Weesp, The Netherlands).

METHODS

Sixty eyes in fifty-eight patients scheduled for a primary vitrectomy were included. Eyes with previous surgery were excluded as were patients who were treated for an eye or other infection at the moment of surgery. Patients were randomly divided into three study arms: hexamedine di-isetionate (D-group),ofloxacine (T-group) and no drops (B-group). Informed consent was obtained. 20 patients were included in the B- and D-group, 21 patients in the T-group.

The patients were asked to apply a drop of either ofloxacine or hexamedine di-isetionate four times a day for five days prior to surgery. No irritation or allergy was reported. Patients in the control group (B-group) did not use any preoperative antiseptic or antibiotic eyedrops.

After draping but before povidone-iodine wash, a conjunctival wipe was taken with a Qtip in the cul-de-sac and inoculated on biplate blood/Mc Conkey agar by the masked surgeon. The resulting cultures were inspected daily for 5 days and interpreted and graded by a masked bacteriologist. A sterile culture was graded 1, low, intermediate and high grade pathogenous bacteria respectively 2,3 and 4. The bacteria were identified according to the American Society of Microbiology procedures (9).

The grading of the cultures was compared between groups using the Mann-Whitney test, and by the construction of a 95% confidence interval (CI) on the difference in the percentage of sterile cultures. The CIs were constructed using a method based on Wilson's score interval (method 10 from 10).

RESULTS

The results of the preoperative conjunctival cultures are listed in Table 1. All the cultures with grade 2 contained coagulase-negative *Staphylococcus*. The specimen with grade 4 contained *Staphylococcus aureus* and coagulase-negative *Staphylococcus*. There was no statistically significant difference between the gradings in the D group and the T group (Mann-Whitney $p = 0.15$). All 21 patients (100%) in the T group showed the lowest grade (i.e. sterile), while 18/20 (90%) patients in the D group obtained this grade; the difference in percentages is 10,0% (95% CI = –7.1% to 30.1%).

Table I: *Results of preoperative conjunctival cultures*

Grading Group	1	2	3	**4**
B	17 (85%) 95% CI 64.0 to 94.8	2	0	**1**
D	18 (90%) 95% CI 69.9 to 97.2	2	0	**0**
T	21 (100%) 95% CI 84.5 to 100	0	0	**0**
D + T	**39 (95%) 95% CI 83.9 to 98.7**	**2**	**0**	**0**

The following scoring system was applied: 1= sterile, 2= low grade pathogenous bacteria, 3= intermediate pathogenous bacteria, 4= high grade pathogenous bacteria.

Patients were divided into three study arms: B= blanco (no drops), D= hexamedinedi-isetionate, T= ofloxacine.

If we compare the B group with the D and T groups counted together, we did not find any statistically significant difference in grading between these two groups (Mann-Whitney $p = 0.17$). In the D and T groups, 39/41 (95.1%) patients had sterile cultures, while 17/20 (85%) patients in the B group received this grade; the difference in percentages is 10,1% (95% CI = –4.8% to 31.5%). Importantly, there was one patient in group B with grade 4, high grade pathogenous bacteria (*Staphylococcus aureus* and coagulase-negative *Staphylococcus*). *Staphylococcus aureus* is considered high grade pathogenous because of its ability to produce fibrinolysin, hemolysin, coagulase and other virulence factors (11). This patient did not develop endophthalmitis after surgery.

DISCUSSION

Although a protective effect has never been demonstrated, it may be considered to prescribe preoperative disinfection of the eye, even in vitreo-retinal surgery, where the incidence of postoperative endophthalmitis is lower than in cataract surgery (1,12).

It has been demonstrated that ofloxacine is effective in sterilizing the ocular adnexa (13,14,15). After topical use, ofloxacine reaches concentrations in the anterior chamber fluid

well above the MIC (minimal inhibitory concentration) of the most common ocular pathogens (16,17), but not in the vitreous (17,18). Whereas the anterior chamber fluid itself can clear a low inoculum of bacteria entering during surgery, the vitreous is less able to eliminate bacterial organisms (6,19).

However among all the prophylactic measures currently in use, the application of povidone-iodine preoperatively is the only one proven to be effective in endophthalmitis prophylaxis (12).
In this trial, the outcome was defined as the grading of the culture obtained after a conjunctival wipe, and not the development of endophthalmitis, because of the low incidence of the latter. Several studies have described the emerging resistance of ocular pathogens, especially to fluoroquinolones, that are antibiotics that are frequently used in the prophylaxis as well as in the treatment of ocular infections (20-22).
Because it has not been demonstrated that the prophylactic topical ophthalmological use was a cause of this increasing resistance, the impact of ophthalmologists in this matter is difficult to quantify (23). In general, the increasing use of an antibiotic results in the development of resistant strains. The increasing resistance rate of ocular pathogens to fluoroquinolones might be the result of its increasing use widespread in other infections or in prophylaxis (21). Cases of postoperative endophthalmitis after intraocular surgery secondary to organisms resistant to all fluoroquinolones and which occurred in spite of a after prophylaxis with fluoroquinolones, have been described (3). A protective effect of antibiotic prophylaxis against postoperative endophthalmitis has never been demonstrated. So in our studty, the only case of high grade pathogenous bacteria in the group without prophylaxis was not statistically significant, and this patient did not develop endophthalmitis.

CONCLUSIONS

The goal of this trial was to investigate whether a topical antiseptic like hexamedine di-isetionate was a reliable alternative for antibiotics for preoperative prophylactic use, whenever a prophylaxis is desirable.
However, because of the relatively small differences in the incidence of positive conjunctival smear taken just before surgery, after ofloxacine and hexamedine di-isetionate, it seems a reasonable option to use, if a prophylaxis is desirable, this antiseptic rather than antibiotics before vitrectomy in order to avoid the possible influence on the development of bacterial resistance with antibiotics.
The main limitation of this trial was its small size. This is indicated by the wide 95% CIs that prohibit strong conclusions. Further investigations are needed to confirm the results.

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