Survey of prevention of postoperative endophthalmitis after cataract surgery in Thailand

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Purpose: To survey the current practice of the prophylaxis methods to prevent postoperative endophthalmitis after cataract surgery in Thailand.

Design: Research questionnaire

Methods: A questionnaire survey via e-mail was conducted with ophthalmologists in Thailand. The duration to answer the questionnaire was from January to April 2014. Data was collected on and descriptively analyzed on prophylaxis methods in preoperative, operative, postoperative, and type of antibiotics used.

Main outcome measures: The primary outcome measure was the current practice after routine methods prophylaxis.

Results: From this survey 72 out of 100 ophthalmologists were included. It shows that most of them prescribed preoperative topical antibiotic eye drop 1 day before surgery and the antibiotic is moxifloxacin (n = 27; 37.5%). All doctors in this survey used antiseptics prior to surgery; povidone-iodine was most commonly used (n = 70; 97.2%). However, they rarely used antibiotics mixed with saline to irrigate the ocular surface. Few surgeons either applied intracameral antibiotic or subconjunctival antibiotic injection. Only 11.1% (n = 8) of surgeons injected intracameral cefuroxime. In postoperative care, fluoroquinolone (moxifloxacin) eye drops were most commonly used (n = 24; 33.3%) and applied antibiotics continuously one month after surgery. On the other hand, oral antibiotics were not commonly used. Various topical anti-inflammatory drugs were used along with topical antibiotics. However, they were usually prescribed in separate bottles. The anti-inflammation drugs were prednisolone (n = 46; 63.9%), dexamethasone (n = 17; 23.6%), and fluorometholone (n = 1; 1.4%). From the aforementioned previous prophylaxis methods, 57 doctors found that the rate of patients diagnosed with postoperative endophthalmitis from cataract surgery was less than 0.1%.

Conclusions: The correct method to prevent postoperative endophthalmitis after cataract surgery remains unclear. Based on this survey, povidone-iodine applied to the ocular surface prior to surgery and fluoroquinolone eye drops used post operation seems to be commonly current practice in Thai ophthalmologists to prevent endophthalmitis after cataract surgery.

Keywords: Endophthalmitis, Cataract, Ophthalmologist, Prophylaxis, Antibiotic, Antiseptic, Moxifloxacin, Povidine-iodine, Intracameral, Subconjunctival, Anti-inflammatory drugs

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Introduction

Postoperative endophthalmitis is an inflammatory condition of the eye, presumed to be due to an infectious process from bacteria, fungi or, on rare occasions, parasites that enter the eye during the perioperative period. Endophthalmitis is a rare condition but it is a serious complication of cataract surgery that every ophthalmic surgeon and patient strives to avoid. The visual loss and debilitation that occur in a large proportion of postoperative endophthalmitis cases can be severe and irreversible.[1] Recent large retrospective studies of the incidence of endophthalmitis after cataract surgery reveal between 0.04% and 0.20%.[2] Factors that increase the risk of infection according to the European Society of Cataract and Refractive Surgeons (ESCRS) include not given intracameral cefuroxime, type of intraocular lens (IOL) material, especially silicone IOLs, complicated or prolonged surgery, vitreous loss, posterior capsule rupture, wound leakage, and possibly the use of clear corneal incisions.[3]

The symptoms of endophthalmitis include mild to severe ocular pain, vision loss, floaters, and photophobia. The hallmark of endophthalmitis is vitreous inflammation, but other signs include eyelid or periorbital edema, ciliary injection, chemosis, anterior chamber inflammation, hypopyon, decrease visual acuity, corneal edema, and retinal hemorrhage. Most cases present to the hospital within 3-10 days of surgery, with a median of 6 days, as reported in the Endophthalmitis Vitrectomy Study (EVS).[4] A significant percentage (22%) of cases presented 2-6 weeks after surgery. The most common bacterial causes in that study were gram-positive coagulase-negative Staphylococcus epidermidis (70%).[2]

According to ESCRS, the application of 5-10% povidone-iodine to cornea, conjunctiva, sac, and periocular skin for a minimum of three minutes prior to surgery can reduce the risk of infection. Ninety percent of ocular surface flora was reduced with use of povidone-iodine. Intracameral cefuroxime was also reported to reduce postoperative endophthalmitis. In recent years, reports of postoperative endophthalmitis rates range from near 0.3-1.2% prior to the institution of intracameral cefuroxime, which reduced to 0.014-0.08% after institution of intracameral cefuroxime at the end of surgery. Reductions of approximately 7 to 28 folds in overall postoperative endophthalmitis rates have been reported. Hence, in modern day, the endophthalmitis rates have declined considerably in countries where the intracameral injection was adopted as a routine method of prophylaxis after cataract surgery.[5, 6, 7, 8] The majority of centres utilized intracameral cefuroxime following published results of the ESCRS study and initial reports from Sweden.[9] Another way to reduce the risk of operative endophthalmitis is the air flow design in the operating room, which should be under positive pressure with doors remaining closed. Equipment should be either sterilized or single use.[1, 3]

Without knowing exactly how, when or why to intervene with effective prophylactic measures, virtually every surgeon nowadays follows a standard care that involves the use of antisepsis and antibiotics. In practice, each country has different methods. Moreover, most standard guidelines were studied and surveyed in Europe and the USA but few were studied in Asia. Thus the authors are interested in the routine methods that most ophthalmologists practice to prevent postoperative endophthalmitis in Thailand.

Methods

Our study was approved by the Human Research Ethics Committee of the Faculty of Medicine, Thammasat University,

Thailand. We performed a questionnaire survey research by sending e-mails to 100 randomized ophthalmologists in Thailand. All doctors that the authors sent a questionnaire had a certification in ophthalmology issued by The Royal College of Ophthalmologist of Thailand. The duration allowed to answer the questionnaire was from January to April 2014. The doctors who did not submit a response within three months (April 2014) were excluded.

Age, gender, duration of work as ophthalmologist, size of hospital that they practiced in, and the number of patients that they performed cataract surgery per year were documented. Prophylaxis methods in preoperative, operative, postoperative, and type of antibiotics were analyzed. Preoperative data regarding type and duration of antibiotic that was prescribed to patients before surgery were collected. Operative data include route of anesthesia drug, antiseptic, antibiotic that mix with saline to irrigate ocular surface, intracameral antibiotic, and subconjunctival antibiotic. Postoperative data include type and duration of antibiotic and anti-inflammation drug. Also suture or sutureless corneal wounds were recorded. Final data were the number of patients that were diagnosed with postoperative endophthalmitis after performing cataract surgery. The data was collected in a standardized form and stored in an electronic datasheet (Microsoft Excel). Quantitative data were calculated as mean, median and standard deviation. Qualitative data were calculated into frequency and percentage.

Results

Seventy-two participants were enrolled in the study and twenty-eight of them were excluded due to a delayed response. Mode age of participants were 20-35 years in this study, of those participants, 41 were males (56.9%) and 31 were females (43.1%). Most participants worked in tertiary care, (54.2%). Mode numbers of patients that underwent cataract surgery per year per each doctor were 101-300 patients.

With regards to preoperative prophylaxis methods, 27 surgeons (37.5%) prescribed fluoroquinolone (moxifloxacin), 24 of them (33.3%) gave multidrug (polymyxin-B, neomycin, gramicidin), 4 of them (5.6%) gave aminoglycoside (tobramycin), and 2 of them (2.8%) gave chloramphenicol, 3 of them (4.2%) gave other drugs to their patients prior surgery. The remaining 12 surgeons (16.7%) did not prescribe any drug to the patients. Most participants used antibiotic eye drops for less than 6 hours 26 (36.1%) prior to surgery, and 24 (33.3%) used antibiotic eye drops for 1 day prior to surgery.

In operative prophylaxis methods, 24 surgeons (33.3%) used topical anesthesia, 22 of them (30.6%) used retrobulbar blocks, and 9 of them (12.5%) used peribulbar blocks. All surgeons used antiseptic to irrigate ocular surface prior operation, 70 of them (97.2%) used povidone-iodine, and 2 of them (2.8%) used chlorhexidine. On the other hand, most of them did not use antibiotics mixed with saline to irrigate the ocular surface (65; 90.3%). Only 14 of them (19.4%) injected intracameral antibiotics to their patients, in contrast, 58 of surgeons (80.6%) did not. The antibiotics that were used to inject were cefuroxime in 8 surgeons (11.1%), other cephalosporins in 3 surgeons (4.2%), and vancomycin 1 surgeon (1.4%). The reason stated by surgeons for not having used intracameral antibiotics was to avoid drug resistance in 2 surgeons, expensive price in 2 surgeons and other non-specified reasons in 10 surgeons. Most surgeons did not inject subconjunctival antibiotics (64; 88.9%). When closing the incision wounds, there were 38 surgeons (52.8%), of which less than 1% sutured the wounds.

In postoperative prophylaxis methods, 37 surgeons (51.4%) used moxifloxacin, 14 surgeons (19.4%) used multidrug (polymyxin-B, neomycin, gramicidin), and 4 surgeons (5.6%) used tobramycin eye drops before eye patch after the surgery was done in the operation room. There were various antibiotic eye drops that prescribed for home medication, 24 surgeons (33.3%) prescribed moxifloxacin, 19 of them (26.4%) gave multidrug (polymyxin-B, neomycin, gramicidin), 11 of them (15.3%) gave tobramycin, 2 of them (2.8%) gave ofloxacin, and 16 of them (22.2%) gave other drugs. Most of them took the duration of antibiotic eye drops used in about 4 weeks (48; 66.7%) for non-complicated operative cases. On the other hand, oral antibiotics were not commonly used (56; 77.8%). Regarding anti-inflammatory eye drops, most surgeons prescribed prednisolone (46; 63.9%), while others prescribed dexamethasone (17; 23.6%), fluorometholone (1 person; 0.7%), prednisolone 1 week then change to fluorometholone in 4 (5.6%), and the last 4 (5.6%) prescribed other drugs. Most of them gave antibiotic and anti-inflammation eye drops in a separate bottle form (47; 65.3%). 17 surgeons (23.6%) gave mixed forms in a single bottle, 2 surgeons (2.8%) gave antibiotic eye drops alone, and 2 surgeons (2.8%) gave only anti-inflammation eye drops. Oral form of anti-inflammatory drugs was prednisolone, but most of them did not give to their patients (65; 90.3%). After having performed prophylaxis methods as mentioned earlier, 57 surgeons (79.2%) reported that the rate of postoperative endophthalmitis is less than 0.1%.

Influencing factors that might affect the rate of postoperative endophthalmitis were analyzed including working experience, surgical technique, antiseptic, antibiotic, and anti-inflammation drug used, also with the type of each drug and duration of usage. The overall

Table 1: Demographic data of surgeon

Demographic Data	**N (%)**
Gender	
Male	41 (56.9%)
Female	31 (43.1%)
Age (years)	
20 - 35 years	53 (73.6%)
36 - 45 years	14 (19.4%)
> 45 years	5 (6.9%)
Duration of work in ophthalmologic field	
1 month -10 years	63 (87.5%)
11 - 20 years	3 (4.2%)
> 20 years	6 (8.3%)
Levels of hospital	
Primary care	4 (5.6%)
Secondary care	29 (40.3%)
Tertiary care	39 (54.2%)

Number of patients that underwent phacoemulsification per year	
> 50	7 (9.7%)
50 - 100	12 (16.7%)
101 - 300	28 (38.9%)
301 - 500	12 (16.7%)
> 500	13 (18.1%)

Table 2: Preoperative data

Preoperative data	**N (%)**
Antibiotic eye drop prior surgery	
Protein synthesis inhibitor (chloramphenicol)	2 (2.8%)
Fluoroquinolone (moxifloxacin)	27 (37.5%)
Aminoglycoside (tobramycin)	4 (5.6%)
Multidrug (polymyxin-B, neomycin, gramicidin)	24 (33.3%)
Other	15 (20.8%)
Duration of antibiotic used prior surgery	
< 6 hours	26 (36.1%)
1 day	24 (33.3%)
2 days	1 (1.4%)
3 - 5 days	4 (5.6%)
Not given	12 (16.7%)

Table 3: Operative data

Operative data	**N (%)**
Route of anesthesia drug	
Retrobulbar block	22 (30.6%)
Peribulbar block	9 (12.5%)
GA	0 (0%)
Topical	24 (33.3%)
Antiseptic to irrigate ocular surface	
Chlorhexidine	2 (2.8%)
Povidone - iodine	70 (97.2%)
Antibiotics mixed with saline to irrigate ocular surface	
Aminoglycoside (gentamicin)	3 (4.2%)
Glycopeptide (vancomycin)	4 (5.6%)
None	65 (90.3%)

Reasons stated for not injecting intracameral antibiotics	
Avoid drug resistance	2 (2.8%)
Expensive	2 (2.8%)
Other	10 (13.9%)
Subconjunctival antibiotics	
Glycopeptide (vancomycin)	20 (27.8%)
Cephalosporin (cefuroxime)	7 (9.7%)
Cephalosporin	1 (1.4%)
None	64 (88.9%)
Percentage of patients that sutured the incision wound	
< 1%	38 (52.8%)
1 - 5 %	18 (25%)
6 - 10 %	9 (12.5%)
> 10 %	7 (9.7%)

Table 4: Postoperative data

Postoperative data	**N (%)**
Antibiotics before eye patching	
Fluoroquinolone (moxifloxacin)	37 (51.4%)
Aminoglycoside (tobramycin)	4 (5.6%)
Multidrug	
(Polymyxin-B, neomycin, gramicidin)	14 (19.4%)
other	16 (22.2%)
Antibiotic eye drops for home medication	
Fluoroquinolone (moxifloxacin)	24 (33.3%)
Aminoglycoside (tobramycin)	11 (15.3%)
Multidrug	19 (26.4%)
(Polymyxin-B, neomycin, gramicidin)	
Ofloxacin	2 (2.8%)
Other	16 (22.2%)
Intracameral antibiotics	
Glycopeptide (vancomycin)	1 (1.4%)
Cephalosporin (cefuroxime)	8 (11.1%)
Cephalosporin	3 (4.2%)
None	58 (80.6%)
Other	2 (2.8%)
Duration of antibiotic eye drops used (for non-complicated cases)	
2 weeks	19 (26.4%)
4 weeks	48 (66.7%)
6 weeks	3 (4.2%)

8 weeks	2 (2.8%)
> 8 weeks	0 (0%)
Oral antibiotic (for non-complicated cases)	
Penicillin (amoxycillin)	2 (2.8%)
Fluoroquinolone (ciprofloxacin)	10 (13.9%)
None	56 (77.8%)
Other	4 (5.6%)
Topical anti-inflammatory drugs	
Prednisolone	46 (63.9%)
Fluorometholone	1 (1.4%)
Dexamethasone	17 (23.6%)
Prednisolone 1 week then change to fluorometholone	4 (5.6%)
Other	4 (5.6%)
Oral anti-inflammatory drugs (for non-complicated cases)	
Prednisolone 3 days	2 (2.8%)
Prednisolone 5 days	3 (4.2%)
Prednisolone 7 days	0 (0%)
None	65 (90.3%)
Other	2 (2.8%)
Form of topical antibiotics and anti-inflammatory drugs	
Gave antibiotic drugs alone	2 (2.8%)
Gave anti-inflammatory drugs alone	2 (2.8%)
Gave antibiotic and anti-inflammatory drugs in separate bottle	47 (65.3%)
Gave antibiotics and anti-inflammatory drugs in the same bottle	17 (23.6%)
Other	4 (5.6%)
Percentage of patients that diagnosed postoperative endophthalmitis	
< 0.1%	57 (79.2%)
0.1 - 0.5%	7 (9.7%)
0.6 - 0.10%	1 (1.4%)
0.11 - 0.20%	1 (1.4%)
Other	10 (13.9%)

results showed in the table below.

Discussion

Nowadays the guideline by the Endophthalmitis Study Group of the European Society of Cataract and Refractive Surgeons (ESCRS) from 2013 is the most used guideline and applied to prevent postoperative cataract surgery endophthalmitis. The ESCRS reported that if 5-10% povidone-iodine was applied to

the cornea, conjunctival sac and periocular skin for a minimum of three minutes prior surgery we can reduce 90% of ocular surface flora.[1, 3, 10] Moreover, the literature continues to support povidone iodine as the primary evidence based preoperative intervention to reduce postoperative endophthalmitis rates.[11] Nevertheless, povidone-iodine should not be used or injected inside the eye due to corneal endothelial cell toxicity. In our survey, most surgeons applied povidone-iodine to the ocular surface before surgery. The authors believe this method is the most effective with the lowest cost to reduce the incidence of postoperative endophthalmitis.

Regarding the preoperative topical antibiotic drops in addition to povidone-iodine, the recent reports from Sweden by Friling and associates examined the value of add-on topical antibiotics in a subset of patients, and concluded that use of topical drops preoperatively had no proven benefit over povidone-iodine.[12] In addition, investigations by He and associates (2009)[13], did not find greater reduction of conjunctival flora when a fourth generation fluoroquinolone drop was administered four times a day for 3 days vs 1 day. Furthermore, Moss and associates (2009)[14] also found no difference in conjunctival flora reduction following povidone-iodine when a fourth-generation fluoroquinolonewas added four times a day for 3 days. These reports underscore that not only a fourth-generation fluoroquinolone has no clear benefit been established for the administration of antibiotic drops preoperatively, but that bacterial resistance may be included, and complete bacterial eradication on the ocular surface is not achieved. In contrast, 83% of surgeons in our survey prescribed topical antibiotics in addition to povidone-iodine to their patients prior to surgery, although most of them gave antibiotics in short durations (within 1 day).

With regards to operative methods, 58 surgeons (80.6%) in this study did not inject intracameral antibiotics. It is un-corresponding to the ESCRS study. The ESCRS study found that the risk for contracting postoperative endophthalmitis was significantly reduced, approximately 5-fold, by an intracameral injection of 1mg cefuroxime at the close of surgery (P=0.001 for presumed endophthalmitis; P=0.005 for proven endophthalmitis). Moreover, there were cases of endophthalmitis due to streptococcal strains which occurred in the cefuroxime-treated group. Aside from centres in the 9 European countries included in the ESCRS study, Sweden, France, South Africa, Singapore, and a region of the United States, routine use of intracameral cefuroxime or another antibiotic at the end of cataract surgery were reported. In our research, we survey a small group of ophthalmologists in Thailand that show intracameral cefuroxime injection is unpopular. The reason may be due to cefuroxime being not a commercially available antibiotic in Thailand, high cost, and surgeons would like to avoid drug resistance.

In the postoperative method, currently, fluoroquinolone drops are favored agents due to their relatively broad spectrum, ability to penetrate the corneal epithelium to some degree, and commercial availability. It is corresponding to our study that most surgeons give fluoroquinolone (moxifloxacin) before eye patch and for home medication. The majority of surgeons prescribe topical antibiotics and anti-inflammatory drugs in a separate bottle due to avoid contamination.

The ESCRS study shows that postoperative intracameral cefuroxime injection is effective without additional topical antibiotics prior surgery to prevent postoperative endophthalmitis. Due to intracameral antibiotic injection which is

not routinely used in Thailand, hence most Thai ophthalmologists prescribe topical antibiotics before and after surgery to their patients instead. Nevertheless, this survey contains a small sample size, which may not represent all Thai ophthalmologists.

Conclusions

Based on the current evidence along with this survey, povidone-iodine applied to the ocular surface prior surgery and fluoroquinolone eye drops used after postoperative seems to be commonly current practice in Thai ophthalmologist to prevent endophthalmitis after cataract surgery.

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Conflicts of interest

The authors have no conflict of interest.

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