

# Prevalence of Endophthalmitis Postoperative Cataract Surgery at Takeo Eye Hospital, Cambodia

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**Abstract:** ***Purpose:** The study aims to find out the rate of endophthalmitis postoperative cataract surgery (EPCS) in 10 399 cases of cataract surgery at Takeo Eye Hospital from January 2007 to December 2012. **Methods:** The design of this study is cross-sectional study that find out the prevalence of endophthalmitis undergone cataract surgery at Takeo Eye Hospital. The secondary data records of patients who had undergone cataract surgery (10 399 data records) from January 2007 through December 2012 and developed postoperative endophthalmitis were drawn from a computerized database. **Results:** Among 10 399 eyes that received cataract surgery at Takeo Eye Hospital were from 24 different provinces and city in Cambodia. From this study we found the rate of EPCS was 0.54 %. Our results also revealed the prevalence of endophthalmitis was a bit higher in male patient's group. Moreover, we also found that the rate of EPCS was dramatically augmented with intraoperative posterior capsular rupture which represented for 51-fold higher in group of patients who had this complication. The onset of EPCS was mostly happened between day 8 and day 14. **Conclusion:** The prevalence of EPCS in Cambodia was 0.54 % has slightly difference comparing to the rate of EPCS in some counties such as India, Thailand, South-Africa, Spain and Sweden, but there are also some countries that have a lower rate than our country. We believe that the good asepsis protocol, proper sterilization system and patient education of postoperative care really play a big role in preventing EPCS.*

**Keywords:** endophthalmitis postoperative cataract surgery, cataract, endophthalmitis

## 1. Introduction

Our eyes change as our age does. Some problem with vision become more common when we are getting older and the most common eye disease is cataract. According to The Report on the Rapid Assessment of Avoidable Blindness (RAAB in 2007) in Cambodia reports that blindness rate was 0.38 % and cataract blindness occupied 74.7 % of the total blindness. Among those people aged  $\geq 50$  had 2.8 % of cataract blindness, which was the highest cause of blindness in this elder age group [1-3].

Surgery to remove cataract with intraocular lens implantation is the only way to help patients to gain back their vision. Although cataract surgery is highly effective and relatively safe, even uncommon surgical complications could potentially harm many patients owing to the enormous numbers. Endophthalmitis is one of the most serious complications of cataract surgery and often results in severe visual loss and might lead to evisceration in severe cases [4].

Although Takeo Eye Hospital delivers a high number of eye surgeries every day, especially cataract surgery, the rate of endophthalmitis postoperative cataract surgery remains unknown, so we designed this study to find the prevalence of endophthalmitis postoperative cataract surgery in this hospital. Moreover, we want to keep this study as the reference for the other researchers to conduct further studies concerning endophthalmitis in Cambodia. Additionally, by this study, we are keen to find the answer that the prevalence of endophthalmitis postoperative cataract surgery in Cambodia is higher or lower comparing to the other countries.

## 2. Methods and materials

This cross-sectional study was designed to investigate the prevalence of endophthalmitis following cataract surgery at Takeo Eye Hospital between 2007 and 2012. Conducted within this timeframe, spanning from January 2007 to December 2012, the study took place at Takeo Eye Hospital, situated in Takeo province, Cambodia, a distinguished training center for ophthalmic residents and nurses. Over the specified period, a total of 10 399 eyes underwent cataract surgery at Takeo Eye Hospital in Takeo province, Cambodia.

### 2.1. Inclusion criteria

- Cambodian patients aged older than 30 years old.
- Patients had been undergone cataract surgery at Takeo Eye Hospital in the period of study.
- Follow-up at least 4 weeks postoperation.

### 2.2. Exclusion criteria

- Patients had been undergone intra-capsular cataract extraction (ICCE).
- Patients had cataract surgery combination with other ocular procedures.
- Patients had secondary cataract.
- Patients had secondary intra-ocular lens implantation.

### 2.3. Sampling technique

Within the study period, by using convenience-sampling selection technique, we found 10 399 eyes with the right inclusion and exclusion criteria identified from Takeo Eye Hospital Electronic Medical Record System. After reviewing

the patient data, we found 56 eyes diagnosed with EPCS.

## 2.4. Data collection

In this study, secondary data were used. All the information of those 56 eyes including ID, age, gender, address, diagnosis, surgical indication, operated eye, surgical date, type of cataract surgery, type of corneal wound construction, posterior capsule rupture with or without vitreous loss during surgery and postoperative information such as medical, day of injection intra-vitreous injection and day of follow up were filled in the data collection sheet designed by researcher. All information of the patient were being kept secret.

### Asepsis protocol for cataract surgery

All patients received standard preoperative care based on the Takeo Eye Hospital's protocol. Briefly, they received 0.3 % ciprofloxacin 6 to 8 times on the day prior to surgery in the eye to be operated. On the day of surgery, 10 % povidone iodine was used to wash the skin around the eye, and 2 drops of 5 % povidone iodine was applied in the inferior cul-de-sac and was left on the eye for a period of 1 minute, followed by thorough irrigation. Prophylactic antibiotics were used gentamicin (40mg in 1ml) and adrenaline (1mg in 1ml, 1:1000) in 1000ml of the irrigating solutions in all patients. Intraoperative complications, such as posterior capsular rent or vitreous loss, were recorded on the patients' cataract surgical record. All patients were admitted for 1 day postoperatively and were examined before discharge.

Subsequent examinations were scheduled at the 1-month and 3-month postoperative visits. Topical antibiotics and steroids were prescribed routinely for all patients. The patients were instructed to use Ciprofloxacin (0.3 %) eye drops 4 times per day for 1 month and Prednisolone acetate (1 %) eye drops in tapering dosages during a 45-day follow-up period. During the first- month, and third-month postoperative visits to the hospital, a comprehensive ophthalmic evaluation including refraction was performed.

### Clinical examination

The diagnosis of endophthalmitis was clinically made and was managed according to a standardized protocol. Onset of an infection endophthalmitis was defined as marked intraocular inflammation occurring within few weeks of cataract surgery, characterized by increased pain, redness, and decreased vision in the presence of hypopyon and cellular infiltration in the anterior chamber and vitreous. The ophthalmologist examined all such patients. If a diagnosis of endophthalmitis was made, the patient immediately underwent initiate intra-vitreous injection Ceftriaxone (2mg in 0.1ml) in the same day of diagnosis.

In general, the antibiotic therapy consisted initially of a combination of broad spectrum, topical, intravitreal, and systemic antibiotics, which was used for urgent management of EPCS cases. The antibiotic commonly used was oral ciprofloxacin in a dosage of 500 mg, every 12 hours, orally. No systemic steroids and intravitreal steroids were given in any patients. The antibiotics was used topical Moxifloxacin (0.5 %) or Ciprofloxacin (0.3 %) eye drop, fortified gentamicin (15mg/ml) eye drop, and intravitreally Ceftriaxone (2mg in 0.1ml).

## 2.5. Data analysis

The data collected from the data collection sheet were inserted into our database using Microsoft Excel 2013 and data were analyzed by the same software. It was ordered by ID, age, gender, address, diagnosis, surgical indication, eye operated, surgical date, type of cataract surgery, type of corneal wound construction, posterior capsule rupture with or without vitreous loss during surgery and postoperative information such as medical, day of injection intra-vitreous injection and day of follow up also noted.

## 3. Results

In six years, period from January 2007 to December 2012, there were 10 399 eyes had undergone cataract surgery at Takeo Eye Hospital. Among the study population, there were 56 eyes (0.54 %) were diagnosed with presumed infectious endophthalmitis postoperative cataract surgery (EPCS) (Table 1).

**Table 1:** Summary of the study result

Characteristic	Total N. of Cataract Surgery	Total N. of EPCS	% of EPCS
	10399	56	0.54 %
<b>Age distribution of EPCS</b>			
31_40	172	3	1.74 %
41_50	481	14	2.91 %
51_60	1618	12	0.74 %
61_70	3670	17	0.46 %
71_80	3527	9	0.26 %
81_90	837	1	0.12 %
>90	34	0	0.00 %
<b>Gender distribution of EPCS</b>			
Female:	6697	34	0.51 %
Male:	3642	22	0.60 %
<b>Rate of EPCS by year</b>			
2007	1241	23	1.85 %
2008	1373	13	0.95 %
2009	1555	14	0.90 %
2010	1875	1	0.05 %
2011	2183	1	0.05 %
2012	2112	4	0.19 %
<b>Rate of EPCS associated with posterior capsule rupture</b>			
No posterior capsule rupture	9855	16	0.16 %
posterior capsule rupture	484	40	8.26 %

Of the total 10399 eyes (female = 6697 eyes; male = 3642 eyes) that underwent cataract surgery during the study period, there were 34 eyes (0.51 %) of total female patients and 22 eyes (0.60 %) of total male patients suffered from EPCS (Figure 1).

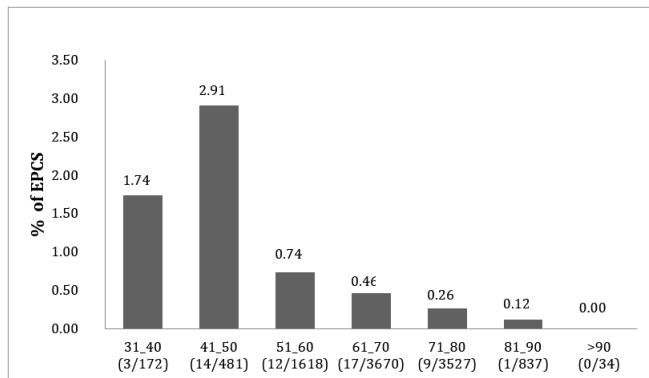


Figure 1: Rate of EPCS by gender

Takeo Eye Hospital has been known as a big eye hospital that provide eye examination and treatment to eye patients from all parts of the country for decades. Our study has found the number of patients who received cataract surgery from each province and its rate of EPCS (Table 2).

This study revealed that the patients who lived in provinces that located far away from Takeo Province such as Kompong Thom, Pursat, Banteay Meanchey, Koh Kong and Prey Veng had the highest rate of EPCS. However, the lower rate of EPCS happened in patients who lived in Takeo Province and the provinces or city nearby (Table 2).

Table 2: Rate of EPCS by province

Province / City	Total N. of Cataract Surgery	Total N. of EPCS	% of EPCS
Kampong Thom	35	1	2.86 %
Pursat	52	1	1.92 %
Banteay Meanchey	53	1	1.89 %
Koh Kong	58	1	1.72 %
Prey Veng	151	2	1.32 %
Battambang	79	1	1.27 %
Preah Sihanouk	108	1	0.93 %
Kampot	663	4	0.60 %
Takeo	6764	37	0.55 %
Kandal	744	4	0.54 %
Kampong Cham	379	2	0.53 %
Phnom Penh	329	1	0.30 %
Kampong Speu	664	0	0.00 %
Svay Rieng	60	0	0.00 %
Siem Reap	55	0	0.00 %
Kratie	35	0	0.00 %
Kampong Chhnang	27	0	0.00 %
Krong Kep	21	0	0.00 %
Preah Vihear	16	0	0.00 %
Oddar Meanchey	12	0	0.00 %
Ratanakiri	11	0	0.00 %
Steung Treng	10	0	0.00 %
Mondulkiri	7	0	0.00 %
Krong Pailin	6	0	0.00 %
<b>Total</b>	<b>10399</b>	<b>56</b>	<b>0.54 %</b>

Our study showed the greatest rate of EPCS was happened in 2007 which represented 1.853 % (23/1241 cataract surgery cases). In 2008 and 2009, the rate of EPCS had similar number, 0.947 % and 0.900 % in 2008 and 2009, respectively. On the other hand, the lowest rate of EPCS arose in 2010 and

2011 which accounted for 0.053 % in 2010 and 0.046 % in 2011 (Figure 2).

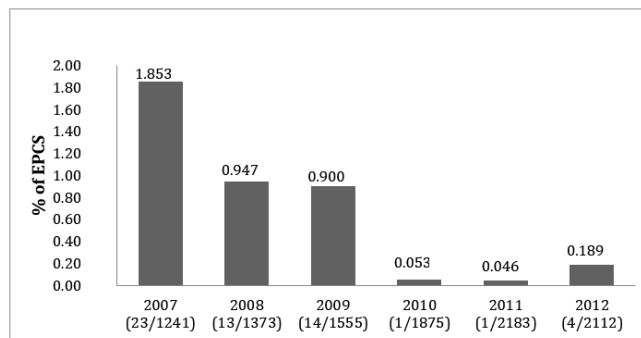


Figure 2: Rate of EPCS by year

Our study demonstrated that there were 9855 eyes did not have the intraoperative posterior capsule rupture while the other 484 eyes had posterior capsule rupture with or without vitreous loss. Among patients who did not have posterior capsule rupture, there were 0.16 % (16/9855 eyes) of EPCS while there were 8.26 % (40/484 eyes) of EPCS for the group who had intraoperative posterior capsule rupture (Figure 3).

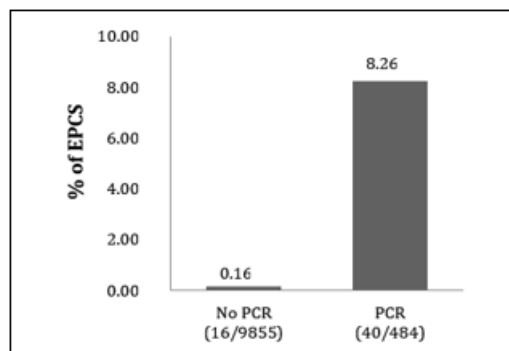


Figure 3: Rate of EPCS associated with posterior capsule rupture

From this study analysis, we found that the highest rate of EPCS happened between day 8 and day 14. The next higher rate occurred between day 15 and day 21 while the lowest number of EPCS rises between day 1 and day 2 (Table 3).

Table 3: Onset of EPCS

Onset of EPCS	No of EPCS	(% of EPCS)
Day 1 – day 2	3	(5.36 %)
Day 3 – day 7	8	(14.29 %)
Day 8 – day 14	23	(41.07 %)
Day 15 – day 21	16	(28.57 %)
> day 21	6	(10.71 %)
<b>Total EPCS</b>	<b>56 Eyes</b>	<b>(100 %)</b>

## 4. Discussion

### 4.1 Rate of EPCS

The prevalence of EPCS in our study was 0.54 % (56/10 399 eyes) which is a comparable rate to various studies. Prajna Lalitha report that The National Survey on Blindness and Visual Outcome after Cataract Surgery conducted in India showed a prevalence of 0.6 % (52/8 836 eyes) for endophthalmitis postoperative cataract surgery in 2001 to 2002 [6]. Wataneer Jenchitr (Thailand) conduct a study on 4 455 eye of postoperative cataract surgery, found rate of EPCS of 0.56 % [7]. Van der Merwe [8] (South Africa) reported rate of EPCS about 0.55 % in 4 214 cataract cases. Similarly, from Spanish study [9], the authors reported rate of EPCS happen in 0.63 % of total 11 696 cataract surgery cases. On the other hand, there are several studies revealed a lower rate of EPCS occurred in their study populations. ESCRS study [5] (9 countries: Austria, Belgium, Germany, Italy, Poland, Portugal, Spain, Turkey, and United Kingdom) reported 0.35 % of their 4 054 cataract patients developed EPCS. Shorstein [10] (USA) found 0.31 % of EPCS arose among his 2 878 cataract cases. Friling [11] (Sweden) demonstrated 0.39 % of EPCS occurred in 2 804 cases of cataract surgery. Another study conducted in Singapore [12] reported rate of EPCS was 0.064 % developed in their 29 539 cataract surgery cases (Table 4).

**Table 4:** Rate of EPCS

References	Country	Year of Publication (Year of the Study)	N. of Cataract Surgery Cases	Rate of EPCS
<i>Our study</i>	<i>Cambodia</i>	<i>2017 (2007-2012)</i>	<i>56/10 399</i>	<i>0.54 %</i>
Prajna Lalitha [6]	India	2005 (2001-2002)	52/8 836	0.6 %
Wataneer Jenchitr [7]	Thailand	2005 (1999-2003)	25/4 455	0.56 %
Van der Merwe [8]	South Africa	2012 (2003-2006)	23/4 214	0.55 %
Romero-Aroca [9]	Spain	2012 (1996-2002)	74/11 696	0.63 %
ESCRS study [5]	9 Countries	2007 (2003-2006)	14/4 054	0.35 %
Shorstein [10]	USA	2012 (2007-2010)	9/2 878	0.31 %
Friling [11]	Sweden	2013 (2005-2010)	11/2 804	0.39 %
Tan Tock Seng [12]	Singapore	2012 (1999-2006)	19/29 539	0.064 %

### 4.2 Relative risk of EPCS associated with posterior capsule rupture

We identified a 51-fold increase in the probabilities of endophthalmitis associated with intraoperative posterior capsule rupture with or without vitreous loss, and this complication was identified in association with 71.42 % (40/56 eyes) of endophthalmitis cases in this study (Table 5).

As it has been stated in the literature, the hypothesis is that elimination of bacteria from the vitreous cavity is much less efficient than elimination from the anterior chamber. Posterior capsule rupture may also be associated with prolonged surgical time with more instrumentation, which is an additional reason for the higher risk of endophthalmitis.

There are several studies that support the hypothesis. A study from Singapore done by Tien Yin Wong [6] performed cataract surgery on 44 803 cases in Asian population revealed patients who had posterior capsule rupture suffered 10-fold higher risk of endophthalmitis. Another study conducted in Iran by Mahmoud Jabbarvand [9] on 480 000 cases of cataract

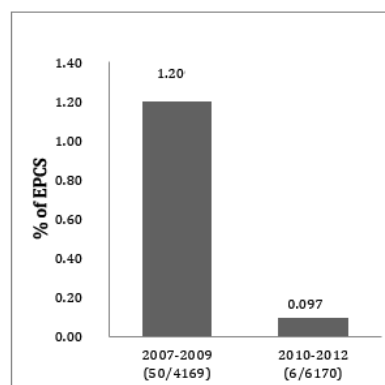
surgery demonstrated a 7.89-fold higher risk to developing endophthalmitis in posterior capsule rupture group.

**Table 5:** Relative risk of PCR with EPCS

References	Country	Number of eyes	Relative risk of posterior capsule rupture with EPCS
<i>Our study</i>	<i>Cambodia</i>	<i>10 399</i>	<i>51 fold</i>
Tien Yin Wong [6]	Singapore	44 803	10 fold
Jerry A. Menikoff [8]	USA	24 105	13.7 fold
Mahmoud Jabbarvand [9]	Iran	480000	7.89 fold

### 4.3. The break event of EPCS rate dropped down

Due to increasing demand for eye care service in Cambodia, Takeo Eye Hospital was renovated in 1996. With CBM support (Christian Blind Mission), the new Takeo Eye Hospital building was officially opened in 2010 for providing better eye care services to Cambodian patients from Takeo and other provinces. Our study period (January 2007 to December 2012) straddles the time when new building was officially opened. Through the break event of moving to new operation theater and modification of asepsis protocol, we got two different results of the rate of EPCS from these two periods (3 years before and 3 years after new building) (Figure 4). In three year period of time (before new building/operation theater), we found the rate of EPCS was 1.20 % which means EPCS occurred in 50 cases among 4169 cataract surgery cases. Another three-year period (after new building and new operation theater), revealed the rate of EPCS dropped down dramatically to 0.097 % which means 6 cases of EPCS happened among 6170 cataract surgery cases. We strongly believe that 12.37-fold reduction of EPCS rate in three year period after moving to new building was more likely due to some reasons. The main reason was new operation theater was set up following the German operation theater system. Moreover, the surgical instrument sterilizer machines were new. Additionally, the patient education postoperatively was widely spread at that time.



**Figure 4:** Rate of EPCS before and after the break event

### 4.4 Study limitation

This study was limited by the following points:

- Sampling technique: convenience-sampling selection
- Data analysis: using Microsoft Excel 2013
- The new building of operation theatre had vastly changed the result of EPCS rate.
- The patient who had follow-up < 4weeks that excluded from the study may affect the result of EPCS rate.

- The causing germs were not identified.
- Despite the above limitations, this study also contains some strong points such as:
- First study about prevalence of endophthalmitis in Cambodia
- Large sample size (10 399 eyes)
- Be the guidance study for the future study on endophthalmitis

## 5. Conclusion

In conclusion, the prevalence of EPCS in our study (0.54 %) has slightly difference comparing to the rate of EPCS in some counties such as India, Thailand, South-Africa, Spain and Sweden, but there are also some countries that had lower rate than our country. We believe that the good asepsis protocol, proper sterilization system and patient education of postoperative care really play a big role in preventing EPCS. Moreover, we also found in the study that the prevalence of EPCS was dramatically augmented with intraoperative posterior capsular rupture which represented for 51-fold higher in group of patients who had this complication.

## 6. Recommendation

### 6.1. To Takeo eye hospital

Even rate of EPCS is suddenly decrease after new building, new operation theatre and modification of asepsis protocol, but we still recommend Takeo Eye Hospital to keep good work on educating postoperative patients to have a good care of the eye including keeping the eye clean and instilling the antibiotic correctly with regular follow up ordered by the ophthalmologist. Moreover, we also suggest Takeo Eye Hospital to perform the vitreous tap for every EPCS to identify the exact germ in order to deliver the appropriate treatment.

### 6.2. To all eye hospitals

We strongly believe that the main causes of this issue are the poor asepsis protocol, intraoperative complications (e.g., posterior capsule rupture) and poor patient postoperative eye care. So, all eye surgeons should upgrade their skill in order to avoid the intraoperative complications. Moreover, all eye hospitals should have the good postoperative eye care education with good asepsis protocol both preoperatively and intraoperatively, because it is a key method to dramatically decrease rate of postoperative endophthalmitis

### 6.3. To other researchers

We highly recommend with enormous encouragement to the other researchers especially the next generation ophthalmologists to continue to conduct further studies on the EPCS specifically to identify the causing germs which will be sequencing a correct treatment for our patients.

### 6.4. To community

We strongly recommend all postoperative cataract surgery patients and their caretakers should be aware clearly about postoperative eye care which is the core strategy to prevent EPCS. More than this they have to know about the alarming signs of EPCS and come to eye hospital whenever they notice that they have any signs of postoperative infection in order to receive early treatment for a better result.

## References

- [1] World Health Organization (WHO). Media center: Visual impairment and blindness. Switzerland : World Health Organization; [updated 2014 Aug, cited 2015 May 15].
- [2] Prut H. Eye health situation in Cambodia. Thai Journal of Public Health Ophthalmology. 2009 Jan-Jun;22(1):1-4.
- [3] Langdon T, Morchen M, El N, Te S B, Tomic N, Keeffe J. Report on rapid assessment for avoidable blindness (RAAB) in Takeo province, Cambodia - 2012. Cambodia: Avoidable Blindness Initiative (ABI); July 2012.
- [4] Ng JQ, Morlet N, Pearman JW, Constable IJ, McAllister IL. Management and outcomes of postoperative endophthalmitis since the endophthalmitis vitrectomy study: the endophthalmitis population study of Western Australia (EPSWA) 's fifth report. Ophthalmology. 2005;(112):1199-206.
- [5] Endophthalmitis Study Group and European Society of Cataract & Refractive Surgeons. Prophylaxis of postoperative endophthalmitis following cataract surgery: Results of the ESCRS multicenter study and identification of risk factors. J Cataract Refract Surg. 2007;6(33):978-88.
- [6] Lalitha P, Rajagopalan J, Prakash K, Ramasamy K, Prajna NV, Srinivasan M. Postcataract Endophthalmitis in South India. Ophthalmology. 2005;112(11):1884-9.
- [7] Watanee J, Sila T, Sambat S. Postoperative endophthalmitis in Priest hospital. Journal of Health Science. 2005;14(1):899-909.
- [8] Van der Merwe J, Mustak H, Cook C. Endophthalmitis prophylaxis with intracameral cefuroxime in South Africa. J Cataract Refract Surg. 2012;38(11):2054.
- [9] Romero-Aroca P, Méndez-Marin I, Salvat-Serra M, Fernández-Ballart J, Almena-Garcia M, Reyes-Torres J. Results at seven years after the use of intracameral cefazolin as an endophthalmitis prophylaxis in cataract surgery. BMC Ophthalmol. 2012 Jan 24;12:2.
- [10] Shorstein NH, Winthrop KL, Herrinton LJ. Decreased postoperative endophthalmitis rate after institution of intracameral antibiotics in a Northern California eye department. J Cataract Refract Surg. 2012;39:8-14.
- [11] Friling E, Lundström M, Stenevi U, Montan P. Six-year incidence of endophthalmitis after cataract surgery: Swedish national study. J Cataract Refract Surg. 2013;39:15-21.
- [12] Tan CS, Wong HK, Yang FP. Epidemiology of postoperative endophthalmitis in an Asian population: 11-year incidence and effect of intracameral antibiotic agents. J Cataract Refract Surg. 2012;38:425-30.