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Incidence of acute post cataract surgery endophthalmitis at a secondary level hospital

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RESEARCH

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ABSTRACT

Background
Postoperative Endophthalmitis is a rare but potentially sight threatening complication of cataract surgery. Due to its grave outcomes, ophthalmologists adopt various preventive measures to minimize the occurrence of this complication.

Aims
To report the incidence of acute onset endophthalmitis after cataract surgery at a secondary level hospital.

Methods
We reviewed medical records of patients who underwent cataract surgery from March 2003 to November 2019 at a secondary hospital. Patient's age, sex, type of cataract surgery performed, type of intraocular lens implanted were noted. Location of incision for patients undergoing phacoemulsification was specified. Post-operative course of patients up to six weeks after surgery was has been tracked to find patients presenting with clinical features of acute endophthalmitis

Results
5365 patients were operated for cataract from March 2003 to November 2019. Out of them 45.5 per cent patients were males and 54.5 per cent were females. Majority of patients were above 61 years of age. One third of patients underwent extracapsular cataract extraction while two third patients were operated by phacoemulsification. The location of incision for majority of patients operated by phacoemulsification was temporal. Three senior ophthalmologists performed these surgeries. Two patients developed acute post-operative endophthalmitis (0.04 per cent).

Conclusion
The low rate of endophthalmitis in our study might be due to strict antiseptic pre-operative measures that is ascertain and done by the surgeon himself and this needs further clinical studies to explore. Our study proves that aseptic surgeries can be performed at secondary level general hospital.

Key Words
Endophthalmitis, cataract surgery, incidence, prophylaxis, prevention

What this study adds:

1. What is known about this subject?
Although rare, post cataract surgery endophthalmitis is a catastrophic intraocular infection resulting in a poor visual prognosis for the majority of patients.

2. What new information is offered in this study?
Whether antiseptic pre-operative measures, if done by the surgeon, has a role in the incidence of post cataract surgery endophthalmitis. Aseptic surgeries can be performed at secondary hospitals safely.

3. What are the implications for research, policy, or practice?
Encourage expansion of cataract operations in general hospitals to cope with the need. There is a need to enact strict policies for pre-operative preparation on surgeons if

further studies support that.

Background

Cataract is a leading cause of preventable blindness in the world with almost 20 million people blind in the world due to cataract.[1] Cataract extraction with intraocular lens implantation is the mainstay of treatment for visually significant cataract and is the most commonly performed eye surgery worldwide.[2] Significant advancements in technology parallel with development of operative techniques have made cataract surgery a safe and efficient procedure with almost complete restoration of visual acuity. Just like any surgical procedure, a number of complications do occur with cataract surgery. Postoperative Endophthalmitis is a rare but potentially sight threatening complication of cataract surgery.[3]

Postoperative endophthalmitis is an infectious condition caused by microorganisms introduced to the interior of the eye during or after the surgical procedure. Acute postoperative endophthalmitis occurs within first 6 weeks of surgery. The organisms recovered from postoperative endophthalmitis specimens usually originate from the conjunctiva, eyelid, or nose of the patient.[3,4] The most commonly identified organisms are Gram-positive bacteria most notably coagulase negative staphylococci.[3,4] The reported incidence of post-operative endophthalmitis ranges from 0.03 per cent to 0.21 per cent.[5,6] Although rare, endophthalmitis is a catastrophic intraocular infection resulting in a poor visual prognosis for the majority of patients. Following endophthalmitis approximately one third of individuals do not recover vision better than counting fingers and 50 per cent do not achieve vision better than 20/40.[7] Due to its grave outcomes, ophthalmologists adopt various preventive measures to minimize the occurrence of this complication. In addition, authorities all over the world adopted many precautions like restricting cataract surgery only to tertiary hospitals.

This study aims to report the incidence of acute endophthalmitis after cataract surgery at a secondary level hospital of a small city at the central region of the Kingdom of Saudi Arabia.

Method

We conducted this study at King Khalid General Hospital (KKGH), at Al-Majmaah city from March 2003 to November 2019. The research was approved by the Central Institutional Review Board – Ministry of Health, Kingdom of Saudi Arabia vide reference no (Central IRB log No: 20 – 21E). Medical records of all patients who underwent cataract surgery during that period were reviewed. The total number of participants included in the study was 5365. These patients were divided in three categories based on operative technique of cataract surgery performed by three different ophthalmologists. One ophthalmologist performed only extracapsular cataract extraction (ECCE) with rigid posterior chamber intraocular lens (PCIOL) implantation. The second ophthalmologist performed phacoemulsification (Phaco) with temporal incision approach and the approach of the third ophthalmologist was Phaco with superior incision. Both surgeons performing phacoemulsification used foldable PCIOL. Age, sex and the type of surgical technique was noted. As per operation theatre protocol of the hospital, anaesthetist and medical specialist had evaluated all patients one day before surgery for fitness. The operating room was one and was shared with other specialties. Strict aseptic measures of skin preparation and draping were observed for all patients. The surgeons themselves and not the assistants did these procedures. No patient was prescribed preoperative systemic or topical antibiotics. For skin preparation 10 per cent povidone iodine was used in all patients. The patients undergoing ECCE and Phaco with superior incision also received five per cent povidone iodine solution instilled into the conjunctival sac at the time of draping. No antibiotic was added to the irrigating solution and no intracameral antibiotic was used at the end of surgery in any patient. The patients in ECCE group received subconjunctival injection of gentamycin and dexamethasone at the end of surgery. All patients received topical antibiotic and steroid at the end of procedure. All patients were examined on post-operative day one. All patients in ECCE group were followed at two, four and six weeks post operatively. Those who underwent Phaco were seen at four weeks post operatively. At each follow up visit, Visual acuity was recorded and full slit lamp examination was done. Patients were routinely prescribed topical antibiotics for two weeks and topical steroids for four to six weeks with tapering steroid drops before discontinuation. They were advised to report to clinic if they develop symptoms of endophthalmitis including decrease in vision, pain and redness of eye. Any patient presenting with clinical features of endophthalmitis during this follow up period was identified based on medical record.

The data was entered and analysed using IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp. Frequencies and percentages were reported for qualitative variables. Normality of quantitative data was checked through one-sample Kolmogorov – Smirnov test.

Results

Five thousand three hundred sixty-five patients were operated for cataract at KKGH between March 2003 and November 2019 (16 years). Out of them, 2441 (45.5 per cent) were males and 2924 (54.5 per cent) were females. 536 (10 per cent) patients were aged less than 40 years, about 1073 (20 per cent) were aged between 40–60 years and 3756 (70 per cent) were aged more than 60 years. About 32 per cent of the patients (1716) underwent ECCE, 376 (7 per cent) were operated by Phaco with superior incision method and majority 3273 (61 per cent) were operated by Phaco with temporal incision.

In our study, two patients developed endophthalmitis. The first patient was an 80 years old female. She was operated by ECCE technique with rigid PCIOL implantation under local anaesthesia. The surgery was uneventful and the patient was fine on postoperative day one. She was sent home on routine antibiotic and steroid eye drops. Later, she presented on post-operative day ten complaining of pain and decreased vision for one day in the operated eye. On examination, she was found to have visual acuity of counting fingers at one-meter, ciliary congestion, and hypopyon with +4 cells in aqueous humour, thick pupillary membrane and poor red reflex. A clinical diagnosis of endophthalmitis was made and based on hospital policy she was immediately referred to tertiary care hospital for further management. We failed to trace her file in the hospital she was referred to, so lab confirmation of the diagnoses is not available. The other patient was an 89 years old male who underwent Phaco with temporal incision using foldable PCIOL implant under local anaesthesia. The surgery again was uneventful and the patient was fine on postoperative day one. Patient was discharged on routine antibiotic and steroid eye drops. Two weeks later the patient came to emergency room with severe pain, redness and decrease of vision. On examination, his visual acuity was hand motion. Slit lamp examination showed, ciliary congestion, hypopyon with +4 cells in aqueous humour. A clinical diagnosis of endophthalmitis was made and he was immediately referred to tertiary care hospital for further management where they confirmed endophthalmitis and they did vitrectomy.

The incidence rate of endophthalmitis was 0.04 among 5365 patients over a period of 16 years. No case of endophthalmitis occurred in patients treated with superior incision approaches of Phaco while the incidence in ECCE was 0.06 and the incidence in Phaco with temporal incision was 0.03. Table 1 shows the incidence of endophthalmitis in various age and sex groups in our study.

Discussion

Postoperative endophthalmitis is a very dangerous sight threatening complication that can render 50 per cent of those who developed it legally blind.[8] Endophthalmitis can happen following any intraocular surgery. Cataract surgery was found to have lower incidence of endophthalmitis as compared to other intraocular procedures including penetrating keratoplasty, trabeculectomy and pars plana vitrectomy as reported by Aaberg et al. in a study of ten-year incidence of endophthalmitis at Bascom Palmer Eye Institute from1984 to 1994.[9] Another study conducted in Dahran, Saudi Arabia found that cataract surgeries had the lowest incidence of endophthalmitis among intraocular surgical procedures including retinal surgeries, corneal transplants and glaucoma surgeries.[10]

The incidence of postoperative endophthalmitis reported in different regions of the world varies widely, and different factors have been reported to influence it. The main reason of endophthalmitis in cataract surgery seems to be the iatrogenic communication between the extraocular and intraocular environment made by the wound during and after the surgery. The latter was proved by Mcdonell and Colleagues. They performed a study of corneal wound dynamics and reported that communication exists between the intraocular and extraocular environments, even in properly constructed corneal wounds.[11]

Table 2 lists the incidence of endophthalmitis reported in various regions of the world. In a systematic review of literature, Taban et al. reported an overall incidence of 0.128 per cent for post-cataract endophthalmitis during period from 1963 to 2003.[12] In the United States, the incidence reported by Wrest and Colleagues in 2005 was 0.21 per cent and was the highest reported incidence among the studies we reviewed.[6] They calculated the incidence of endophthalmitis based on Medicare claim data of the U.S. patients. Their analysis failed to find any explanation of increased incidence of endophthalmitis. In the study by Aaberg et al. at Bascom Palmer Eye Institute, the incidence was 0.08 per cent.[9] At the same center, another study conducted by Miller et al. from the year 2000 to 2004 reported lower incidence (0.04 per cent) than before.[13] The incidence of that study is the same as our results. Two other studies from Sweden and Singapore also, reported the same incidence we reported.[14,15] Two previous studies in Saudi Arabia with comparable sample size reported higher incidence (0.10 per cent, 0.123 per

cent).[10,16] A third study with big sample size, conducted at King Khalid Eye Specialist Hospital (KKESH), Riyadh, Saudi Arabia, from 1997 to 2006 reported the incidence to be 0.068 per cent.[17] During first five years of the study, the incidence was 0.05 per cent, which is very near to our incidence, which increased 1.51 times during next five years to 0.08. All the three studies conducted in Saudi Arabia were done in tertiary level eye specialist hospitals. This may explain partly the higher incidence. In these hospitals, most of the cases are complicated and associated with other diseases, and in many occasions' cataract surgery is combined with other surgeries that increase the time and manipulation which hence increase the risk of infection.

Fliring et al. from Sweden and Yao et al. from china both in 2013 reported lower incidence of 0.029 per cent and 0.032 respectively.[5,18] Our relatively low incidence of endophthalmitis could be explained by the fact that only three experienced surgeons are involved, allowing the control of the pre and post-operative preventive measures. One very important factor is that strict preoperative aseptic measures are done by the surgeons themselves and not by the nurses or operating room technicians. This was not addressed specifically in the previous studies but it is known that in many busy institutes the nurses or technicians do the preoperative preparation. Here we are raising this as new factor that could influence the incidence of endophthalmitis. It is well-established that povidone iodine is an accepted prophylaxis for post-operative endophthalmitis. Buzzard et al. found that preoperative povidone iodine reduces the risk of endophthalmitis.[19] A recent work by Ciulla et al. found that preoperative povidone Iodine antisepsis is an effective prophylaxis for endophthalmitis.[20] Jonathan and Colleagues found preoperative skin preparation was independently associated with a significant reduction in the risk for postoperative endophthalmitis.[21] If this is done properly and consistently by an experienced surgeon, it may decrease further the endophthalmitis incidence; this needs further clinical studies to proof.

Although our sample size is not as high as some other studies, but it is quite enough to give a good envisage about the real risk of endophthalmitis in a secondary general hospital in KSA. This may help authorities to change some of the restrictions put on hospitals like these under the pretext of increase risk of infection.

The risk of endophthalmitis in cataract surgeries may increase by certain alleged factors. Mayer et al. found that injectable intraocular lenses decrease the risk of endophthalmitis. The proposed explanation was the fact that injectable intraocular lenses do not make contact with the ocular surface omitting the possible risk of contamination from ocular surface flora.[22] In our study, injectable lenses were used in all Phaco surgeries, while in ECCE non-injectable rigid lenses have been used. Incidence of endophthalmitis was equal in both. Implantation of secondary intraocular lens was associated with a higher incidence of endophthalmitis than primary lens implantation as reported by Aaberg et al.[9] In our study both patients who develop endophthalmitis were with primary implanted intraocular lens.

Opinions about the type of operation, location of the wound and its endophthalmitis risk still differ between supporters and opponents. In the study done by Miller et al. at Bascom Palmer Eye Institute, inferior location of incision was a potential risk factor for endophthalmitis but clear corneal incision was not associated with increased risk.[13] In the Swedish national reporting database there is increased incidence of endophthalmitis in clear corneal and temporal incisions, as compared to that in superior and sclerocorneal incisions.[14] Wykoff and colleagues found no increase incidence of endophthalmitis in association with suture less clear corneal incision techniques for cataract surgery.[23] Cooper et al. and Nagaki and coworkers reported a threefold and 4.6-fold respectively, higher risk of endophthalmitis after cataract surgery with a clear cornea incision compared with a superior scleral tunnel incision.[24,25] The study conducted by Taban et al. also found increased incidence of endophthalmitis associated with suture less clear corneal incision.[12]

At a regional eye hospital in India, an analysis of over 42000 consecutive cases, including manual ECCE surgery and Phaco, revealed 0.09 per cent incidence of postoperative endophthalmitis over a period of almost two years.[26] The number of ECCE performed was three times higher than that of Phaco. More than 90 per cent cases of endophthalmitis occurred in ECCE patients. In Japan, the incidence of endophthalmitis was 0.05 per cent with a significantly higher incidence in ECCE than in Phaco.[27] In our study, one case of endophthalmitis had ECCE surgery and the other had Phaco with temporal incision. Looking at our results it seems that there is no difference in the risk of endophthalmitis between Phaco and ECCE. We cannot conclude that superior incision is safer in Phaco as the number of cases operated with superior incision is less and the incidence in the temporal incision is very low. Overall, it seems that suture less clear corneal incision carries a little higher risk due to the probability that the non-sutured

wound allows passage of fluids carrying organisms along with to the inside of the eye in rare occasions. For that, considering to suture the wound if it is not well sealed is highly recommended.

Advanced patient age and rupture of posterior capsule are other reported risk factors for post-operative endophthalmitis. In Canada, Hatch et al. reported endophthalmitis incidence of 0.14 per cent after cataract surgeries and found that the rate was significantly higher in patients older than 85 years than younger patients.[28] Their study also found that there was 10-fold higher incidence of endophthalmitis in patients with intraoperative rupture of posterior capsule. Freeman and colleagues reported similar incidence of 0.15 per cent and their study supported that old age was associated with increased risk of endophthalmitis.[29] Yao k et al. found that a major risk factor of endophthalmitis was intraoperative communication with the vitreous.[18] In our study both cases who developed endophthalmitis were old but none of them developed posterior capsule rupture intraoperatively. Because most of cataract surgeries are done for older people and the incidence of endophthalmitis is too low, most of reported cases would be from that age group. Ruptured capsule obviously increases the risk of passing of organisms to the posterior segment where natural defensive mechanism is far weak than in anterior segment.

Use of medications perioperatively is another hot area of debate. Post-operative subconjunctival antibiotic injections were routine step in ECCE procedure. With the introduction of Phaco this is not being used routinely. In the study of Jonathan and Colleagues, they found that subconjunctival antibiotics halved the risk for endophthalmitis.[21] Colleaux et al. concluded that prophylactic subconjunctival antibiotic injections at the conclusion of cataract surgery decrease the incidence of postoperative endophthalmitis. They reported 0.07 per cent incidence of endophthalmitis in 13866 Phaco procedures performed by nine different surgeons at a single surgical unit.[30] A population-based study from Australia found the use of subconjunctival antibiotics to be independently associated with a decreased risk of endophthalmitis.[10] Mandal et al. found that omission of subconjunctival antibiotic prophylaxis led to a series of cases of endophthalmitis at a center in England.[31] In our study, the patient, who developed endophthalmitis from the ECCE group, received subconjunctival injection of antibiotic at the end of surgery, while the other one from Phaco group did not. Keeping in mind that the majority of our cases (61 per cent) are from Phaco group gives a hint that subconjunctival injection of antibiotic did not make any difference in the incidence of endophthalmitis.

Topical antibiotics is being proposed preoperatively and postoperatively to prevent endophthalmitis. There is no randomized controlled clinical trial to prove the prophylactic benefit of any preoperative or postoperative topical antibiotic. One study found that application of topical antibiotic preoperatively significantly reduces the bacterial counts in conjunctival sac and reduce the risk of endophthalmitis.[32] But this practice may lead to emergence of resistant strains of bacteria. Cases have been reported where even topical antibiotics can cause anaphylactic reaction.[33] Kessel and colleagues failed to find any evidence that topical antibiotic treatment after cataract surgery lowers the risk of endophthalmitis and speculated that this practice may even lead to development of resistant bacterial strains.[34] The practice of using preoperative topical antibiotics is not followed in our hospital so none of our patients received it, although the incidence of endophthalmitis is very low. Use of postoperative antibiotics has the rationale of preventing the effect of steroid that is known to increase the infection rate.

The European Society of Cataract and Refractive Surgeons (ESCRS) performed a large randomized controlled trial and reported that intracameral injection of cefuroxime was associated with an approximately fivefold reduction in endophthalmitis rates following Phaco.[35] Another study conducted by Fliring et al. found declining rate of 0.03 per cent and suggested that intracameral antibiotics were associated with reduced incidence of endophthalmitis.[5] In Spain, a retrospective study of Asenico et al. reported the incidence of 0.19 per cent over a period of 13 years in patients undergoing both ECCE and Phaco.[36] They found the use of intraoperative vancomycin in irrigating fluid as effective measure in reducing endophthalmitis as intracameral antibiotics. In Singapore, Tan et al. reviewed 11-year incidence of endophthalmitis finding an overall figure of 0.04 per cent. Interestingly, during the first 7 years the incidence was 0.06 per cent without the use of intracameral antibiotics, which reduced to 0.01 per cent during last 4 years of the study due to adoption of intracameral cefazolin.[15] At our facility, we do not use antibiotics in irrigating solution or intracameral injection at the end of procedure. We believe that the use of perioperative antibiotics, either in irrigating solution or intracameral injection, does not affect the incidence of endophthalmitis and it is supported by our low incidence.

Conclusion

We believe that the low rate of endophthalmitis in our study might be due to strict antiseptic pre-operative measures that is ascertain and done by the surgeon himself, this needs further clinical studies to explore. Our study proves that aseptic surgeries can be performed at secondary level general hospital safely provided properly trained staff is available and standard protocols of operative techniques are followed.

References

1. Lee C, Afshari N. The global state of cataract blindness. Curr Opin Ophthalmol. 2017;28(1):98–103.
2. Williams A. Longitudinal rates of cataract surgery. Arch Ophthalmol. 2006;124(9):1308.
3. Karacal H, Kymes S, Apte R. Retrospective analysis of etiopathogenesis of all cases of endophthalmitis at a large tertiary referral center. Int Ophthalmol. 2007;27(4):251–259.
4. Duan F, Wu K, Liao J, et al. Causative Microorganisms of Infectious Endophthalmitis: A 5-Year Retrospective Study. J Ophthalmol. 2016;2016:1–7.
5. Friling E, Lundström M, Stenevi U, et al. Six-year incidence of endophthalmitis after cataract surgery: Swedish national study. J Cataract Refract Surg. 2013;39(1):15–21.
6. West E, Behrens A, McDonnell P, et al. The Incidence of Endophthalmitis after Cataract Surgery among the U.S. Medicare Population Increased between 1994 and 2001. Ophthalmol. 2005;112(8):1388–1394.
7. Lalwani G, Flynn H, Scott I, et al. Acute-Onset Endophthalmitis after Clear Corneal Cataract Surgery (1996–2005). Ophthalmol. 2008;115(3):473–476.
8. Kamalarajah S, Silvestri G, Sharma N, et al. Surveillance of endophthalmitis following cataract surgery in the UK. Eye. 2004;18(6):580–587.
9. Aaberg T. Nosocomial acute-onset postoperative endophthalmitis survey A 10-year review of incidence and outcomes. Ophthalmol. 1998;105(6):1004–1010.
10. Alshihry A. Epidemiology of Postoperative Endophthalmitis (POE) in a specialized eye hospital. Epidemiology. 2014;04(01).
11. McDonnell P, Taban M, Sarayba M, et al. Dynamic morphology of clear corneal cataract incisions. Ophthalmol. 2003;110(12):2342–2348.
12. Taban M. Acute endophthalmitis following cataract surgery. Arch Ophthalmol. 2005;123(5):613.
13. Miller J, Scott I, Flynn H, et al. Acute-onset endophthalmitis after cataract surgery (2000–2004): Incidence, clinical settings, and visual acuity outcomes after treatment. Am J Ophthalmol. 2005;139(6):983–987.
14. Lundström M, Wejde G, Stenevi U, et al. Endophthalmitis after cataract aurgery. Ophthalmol. 2007;114(5):866–870.
15. Tan C, Wong H, Yang F. Epidemiology of postoperative endophthalmitis in an Asian population: 11-year incidence and effect of intracameral antibiotic agents. J Cataract Refract Surg. 2012;38(3):425-430.
16. Khandekar R, Al-Motowa S, Alkatan H, et al. Incidence and determinants of endophthalmitis within 6 months of surgeries over a 2-year period at King Khaled Eye Specialist Hospital, Saudi Arabia: A review. Middle East Afr J Ophthalmol. 2015;22(2):198.
17. Al-Mezaine H, Kangave D, Al-Assiri A, et al. Acute-onset nosocomial endophthalmitis after cataract surgery. J Cataract Refract Surg. 2009;35(4):643–649.
18. Yao K, Zhu Y, Zhu Z, et al. The incidence of postoperative endophthalmitis after cataract surgery in China: a multicenter investigation of 2006–2011. Br J Ophthalmol. 2013;97(10):1312–1317.
19. Buzard K, Liapis S. Prevention of endophthalmitis. J Cataract Refract Surg. 2004;30(9):1953–1959.
20. Ciulla T, Starr M, Masket S. Bacterial endophthalmitis prophylaxis for cataract surgery. Ophthalmol. 2002;109(1):13–24.
21. Ng J, Morlet N, Bulsara M, et al. Reducing the risk for endophthalmitis after cataract surgery: Population-based nested case-control study. J Cataract Refract Surg. 2007;33(2):269–280.
22. Mayer E. A 10 year retrospective survey of cataract surgery and endophthalmitis in a single eye unit: injectable lenses lower the incidence of endophthalmitis. Br J Ophthalmol. 2003;87(7):867–869.
23. Wykoff C, Parrott M, Flynn H, et al. Nosocomial Acute-Onset Postoperative Endophthalmitis at a University Teaching Hospital (2002–2009). Am J Ophthalmol. 2010;150(3):392–398.
24. Cooper B, Holekamp N, Bohigian G, et al. Case-control study of endophthalmitis after cataract surgery comparing scleral tunnel and clear corneal wounds. Am J Ophthalmol. 2003;136(2):300–305.
25. Nagaki Y, Hayasaka S, Kadoi C, et al. Bacterial endophthalmitis after small-incision cataract surgery. J Cataract Refract Surg. 2003;29(1):20–26.
26. Ravindran R, Venkatesh R, Chang D, et al. Incidence of post-cataract endophthalmitis at Aravind Eye Hospital. J Cataract Refract Surg. 2009;35(4):629–636.
27. Oshika T, Hatano H, Kuwayama Y, et al. Incidence of endophthalmitis after cataract surgery in Japan. Acta Ophthalmol Scand. 2007;85(8):848–851.
28. Hatch W, Cernat G, Wong D, et al. Risk factors for acute

endophthalmitis after cataract surgery: A population-based study. Ophthalmol. 2009;116(3):425–430.
29. Freeman E. Rate of endophthalmitis after cataract surgery in Quebec, Canada, 1996-2005. Arch Ophthalmol. 2010;128(2):230.
30. Colleaux K, Hamilton W. Effect of prophylactic antibiotics and incision type on the incidence of endophthalmitis after cataract surgery. Can J Ophthalmol. 2000;35(7):373–378.
31. Mandal K, Hildreth A, Farrow M, et al. Investigation into postoperative endophthalmitis and lessons learned. J Cataract Refract Surg. 2004;30(9):1960–1965.
32. Carron A, Samudio M, Laspina F, et al. Efficacy of topical 0.3% ciprofloxacin application in reducing the conjunctival biota of patients undergoing cataract extraction. Arch Soc Esp Oftalmol (English Edition). 2013;88(9):345–351.
33. Ullman M, Midgley K, Kim J, et al. Anaphylactic reaction secondary to topical preoperative moxifloxacin. J Cataract Refract Surg. 2016;42(12):1836–1837.
34. Kessel L, Flesner P, Andresen J, et al. Antibiotic prevention of postcataract endophthalmitis: a systematic review and meta-analysis. Acta Ophthalmol. 2015;93(4):303–317.
35. Bohigian G. ESCRS study of endophthalmitis prophylaxis. J Cataract Refract Surg. 2006;32(9):1406–1407.
36. Asencio M, Huertas M, Carranza R, et al. A case-control study of post-operative endophthalmitis diagnosed at a Spanish hospital over a 13-year-period. Epidemiol Infect. 2014;143(1):178–183.
37. Krikonis T, Panagiotoglou T, Tsika C, et al. Endophthalmitis after cataract extraction: Incidence, treatment, and outcome in Crete, Greece, during period 2000–2008. Semin Ophthalmol. 2009;24(6):234–238.

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PEER REVIEW

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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ETHICS COMMITTEE APPROVAL

The research was approved by the Central Institutional Review Board – Ministry of Health, Kingdom of Saudi Arabia vide reference no (Central IRB log No: 20 – 21E)

Table 1: Incidence of postop endophthalmitis in our study

		No. (%)	Endo* cases	Incidence (%)
ECCE†		1716 (32%)	1	0.06
PWSI‡		376 (7 %)	0	0.00
PWTI§		3273 (61%)	1	0.03
Total		5365 (100%)	2	0.04
Gender	Male	2441 (45.5%)	1	0.04
	Female	2924 (54.5%)	1	0.03
Age (year)	<40	536 (10%)	0	0.00
	40–60	1073 (20%)	0	0.00
	≥61	3756 (70%)	2	0.05

* Endophthalmitis, † Extracapsular cataract extraction, ‡ Phacoemulsification with superior incision, § Phacoemulsification with temporal incision

Table 2: Incidence of postoperative endophthalmitis in various studies

Country	*Authors*	*Year*	*Duration of study*	*Sample*	*Endophthalmitis Cases*	*Incidence%*
SAUDI ARABIA						
*Saudi Arabia**	Khalid et al.	2020	2003-2019	5365	2	0.04
Saudi Arabia [10]	Alshihry AM.	2014	2006-2012	5940	6	0.101
Saudi Arabia [16]	Khandekar et al.	2013	2010-2012	6481	8	0.123
Saudi Arabia [17]	Al-Mezaine et al.	2009	1997-2006	29,509	20	0.068
ASIA						
China[18]	Yao et al.	2013	2006-2011	201757	66	0.032
Singapore[15]	Tan et al.	2012	1999-2010	50,000	21	0.042
India[26]	Ravindran et al.	2009	2007-2008	42426	38	0.089
Japan[27]	Oshika et al.	2007	2003	100539	52	0.052
EUROPE						
Spain[36]	Asenico et al.	2015	1996-2008	18287	35	0.191
Sweden[5]	Friling et al.	2013	2005-2010	464996	135	0.029
Greece[37]	Krikonis et al.	2009	2000-2008	8389	7	0.083
Sweden[14]	Lundstorm et al.	2007	2002-2004	225471	109	0.048
UK[8]	Kamalarajah et al.	2004	1999-2000	230000	314	0.136
USA/ CANADA						
Canada[29]	Freeman et al.	2010	1996-2005	490690	754	0.153
Canada[28]	Hatch et al.	2009	2002-2006	442177	617	0.139
USA[13]	Miller et al.	2005	2000-2004	15920	7	0.043
USA[6]	West et al.	2005	1994-2001	477627	1026	0.215
Canada[24]	Colleaux et al.	2000	1994-1998	13886	10	0.072
USA[9]	Aaberg et al.	1998	1984-1994	41654	34	0.082

*Our study