

# Anterior Chamber Contamination during Phacoemulsification after Povidone-Iodine Application

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**Objective:** To determine the rate of anterior chamber contamination during phacoemulsification after applying 5% povidone-iodine prior to surgery.

**Material and Method:** One hundred eyes from 100 patients having phacoemulsification cataract surgery by a single surgeon at Ramathibodi Hospital between October 2010 and March 2011 were included in the present study. Povidone-iodine 5% solution eye drops were used in all patients at least three minutes before the operation. Anterior chamber fluid was aspirated at the end of the procedure for culture in chocolate agar.

**Results:** Anterior chamber fluid cultures were positive in three eyes (*Pseudomonas oryzihabitans* in 1 eye, *Klebsiella pneumoniae* in 1 eye, and yeast in 1 eye). These three patients had no exaggerated or prolonged postoperative intraocular inflammation compared to others. No patients in the present study developed endophthalmitis.

**Conclusion:** Povidone-iodine 5% solution eye drops before operation may control microbial contamination during phacoemulsification.

**Keywords:** Anterior chamber contamination, Phacoemulsification, Povidone-iodine

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Cataract is a common cause of visual impairment among the elderly. It is the leading cause of blindness worldwide. Many different surgical procedures with a high success and low complication rates have been used to remove cataract from the eye. Nowadays, phacoemulsification has gained popularity among ophthalmologists and is the treatment of choice for cataract surgery. Postoperative endophthalmitis is a devastating complication of cataract surgery that can result in a poor visual outcome and possible permanent blindness. The incidence of infectious endophthalmitis after cataract surgery has been reported to be between 0.15% and 0.5%<sup>(1)</sup>. It can occur in the acute or chronic form, depending on the virulence of microorganisms. Clinical signs and symptoms of endophthalmitis include pain, decreased vision, lid edema, conjunctival hyperemia, corneal edema, hypopyon, and vitreous

inflammation. The most important perioperative risk is microbial contamination of the anterior chamber during cataract surgery.

Several methods have been introduced as a strategy to reduce microbial contamination of the eye during routine phacoemulsification cataract surgery such as preoperative use of topical antibiotic eye drops, careful draping to isolate eyelids and eyelashes, avoiding pooling of surface fluid, and using aseptic surgical techniques. In the year 2007, ESCRS guideline also recommended to use Povidone-iodine 5% solution eye drops 3 minutes before cataract surgery in order to reduce the conjunctival bacterial load and decrease endophthalmitis rates<sup>(1)</sup>.

Previous studies have found that an incidence of microbial contamination of the anterior chamber during cataract surgery ranged from 8.1-46.25%<sup>(2-5)</sup>. Preoperative instillation of topical 5% povidone-iodine eye drops has recently been shown to be associated with lower rates of bacterial contamination in the anterior chamber<sup>(6-9)</sup>. However, to the best of our knowledge, there has been no such report in Thai eyes. The purpose of the present study was to determine the rate of anterior chamber contamination during

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phacoemulsification after 5% povidone-iodine application prior to surgery.

### Material and Method

The present study was conducted between October 2010 and March 2011, at Ramathibodi Hospital, Bangkok. The study protocol adhered to the tenets of the Declaration of Helsinki and was approved by the ethics committee of Mahidol University School of Medicine. The senile cataract patients who underwent cataract surgery with phacoemulsification and implantation of foldable intraocular lens by a single surgeon (PS) were included in the present study. Patients with a history or evidence of previous ocular surgery, adnexal, local, or systemic infections with topical or systemic antibiotic therapy within one month, intraoperative complications like posterior capsule rupture or vitreous loss, and having other additional procedures were excluded from the present study.

Preoperatively, each patient received 1 drop of 1% Tropicamide (Mydracyl<sup>®</sup>, Alcon, USA) every 5 minutes for 3 times for pupillary dilation. Antibiotics eye drops were also given, using Poly-oph<sup>®</sup> (combination of Polymyxin B, Neomycin, Gramicidin, Seng Thai, Thailand), every 5 minutes for 3 times. The eye was anesthetized with topical tetracaine hydrochloride 0.5% eye drops and peribulbar block. After anesthesia, 1 drop of 5% povidone iodine (10% povidone-iodine diluted 1:1 with normal saline) was placed in the conjunctival fornices at least 3 minutes before surgery. In the operating room, the periocular area was disinfected with 5% povidone iodine. Lid margins were scrubbed with a cotton-tipped applicator soaked with 5% povidone iodine solution. The eyelids were held open and all eyelashes and eyelid margins were covered by a Steri-Drape (3M). A central aperture permitted exposure of the globe, while the eyelids remained exteriorized and secured by a lid speculum.

Phacoemulsification was performed through a 3.0 mm clear corneal incision and posterior chamber foldable IOL was implanted. At the end of surgery, 0.1 ml of the anterior chamber fluid was collected using a sterile disposable 27-gauge needle fitted to a tuberculin syringe and inoculated directly onto chocolate agar. The inoculated agar plate was immediately transferred to the laboratory and incubated at 37°C with 5% CO<sub>2</sub> for 14 days. Cultures were called positive only if organisms grew in the central inoculated area of the agar within 14 days of inoculation.

This culture media was chosen to maximize isolation and identification of both aerobes and anaerobes, regarding the limited volume of inoculum. All cultures were interpreted by experienced microbiologists.

Postoperatively, all patients returned for clinical follow-up at 1 day, 1 week, and 1 month after surgery.

### Results

One hundred patients (34 males and 66 females) were included in the present study. The age of the patients ranged from 48 to 92 years with a mean age of 69.07 years. Three patients (3%) had a positive culture in which the species was *Pseudomonas oryzihabitans* in one eye, *Klebsiella pneumonia* in one eye and yeast in one eye. During the 1-month follow-up, none of all three culture-positive patients had exaggerated, prolonged or delayed postoperative intraocular inflammation compared to other patients. No patients in the present study were lost to follow-up or developed endophthalmitis.

### Discussion

The present study demonstrated that microbial contamination rate of the anterior chamber during phacoemulsification after 5% povidone-iodine application was 3%. Comparison with other studies, anterior chamber contamination rate in the present study (3%) is much lower than those in studies not using povidone-iodine (46.25%)<sup>(2)</sup> and similar to those in studies that used 0.25-5% povidone-iodine (0-11%)<sup>(10,11)</sup>.

Bausz et al used 5% povidone-iodine eye drops preoperatively without preoperative antibiotics prophylaxis on 97 eyes and found that bacterial contamination rate of the anterior chamber was approximately 2%<sup>(7)</sup>. These results were comparable to those from the present study in which preoperative antibiotic eye drops were used along with 5% povidone-iodine, instead of using povidone-iodine alone. This might indicate that using povidone-iodine eye drops for preoperative disinfection only can sufficiently decrease microbial contamination in the anterior chamber during cataract surgery and may provide additional benefits of reducing the risk of antibiotic resistance.

Three of the presented patients with positive cultures did not develop excessive inflammation or endophthalmitis. This might be explained by the small inoculum size, relatively low virulence characteristics

of the microorganisms, integrity of the posterior capsule, and antimicrobial properties of the aqueous humor<sup>(4,12,13)</sup>.

Because most of the bacterial contaminations in the anterior chamber have been reported to come from the conjunctiva<sup>(9)</sup>, therefore, yeast found in the present study might be a contaminant from the sterile cotton bud tip that was used to spread a sample of fluid from the anterior chamber in chocolate agar.

Meticulous preoperative preparation for cataract surgery such as the use of povidone-iodine eye drops, preoperative antibiotic eye drops, sterile drape to prevent contamination from eyelashes and eyelids and perioperative aseptic technique can reduce microbial contamination in the anterior chamber and potentially decrease the incidence of postoperative endophthalmitis. Improving technique for sealing a clear corneal incision and good post-operative care also have an important role in preventing endophthalmitis following cataract surgery. Additionally, patients should be made aware of symptoms and signs indicative of endophthalmitis and early consult an ophthalmologist if any danger signs or symptoms are present.

### Conclusion

Application of 5% povidone-iodine solution eye drops before operation can reduce microbial contamination during phacoemulsification.

### Potential conflict of interest

None.

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การปนเปื้อนของช่องหน้าม่านตาระหว่างการผ่าตัดต่อกระจกแบบใช้คลื่นเสียงอัลตราซาวด์หลังการใช้ povidone-iodine

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**วัตถุประสงค์:** เพื่อศึกษาอัตราการปนเปื้อนเชื้อโรคในช่องหน้าม่านตาหลังการผ่าตัดสลายต่อกระจก หลังการใช้ 5% povidone iodine หยอดตาก่อนผ่าตัด

**วัสดุและวิธีการ:** เป็นการศึกษาแบบพรรณนา คัดเลือกผู้เข้าร่วมการศึกษาจากผู้ที่ได้รับการผ่าตัดต่อกระจก โดยการใช้คลื่นเสียงอัลตราซาวด์สลายต่อกระจกโดยจักษุแพทย์คนเดียว ตั้งแต่เดือนตุลาคม พ.ศ. 2553 ถึง มีนาคม พ.ศ. 2554 ที่ โรงพยาบาลรามาริบัติ มหาวิทยาลัยมหิดล ได้ทั้งหมด 100 คน ผู้ป่วยจะได้รับการหยอดตาด้วย 5% povidone-iodine อย่างน้อย 3 นาทีก่อนผ่าตัด จากนั้นทำการเก็บน้ำในช่องหน้าม่านตาจำนวน 0.1 มิลลิลิตร เมื่อการผ่าตัดเสร็จสิ้น เพื่อส่งเพาะเชื้อด้วย chocolate agar

**ผลการศึกษา:** อุบัติการณ์ของการปนเปื้อนเชื้อโรคเข้าสู่ช่องหน้าม่านตาหลังการใช้ 5% povidone-iodine อยู่ที่ร้อยละ 3 เป็นเชื้อ *Pseudomonas oryzihabitans* 1 ราย, *Klebsiella pneumonia* 1 ราย และ yeast 1 ราย ไม่พบว่าผู้ป่วยทั้ง 3 ราย มีการอักเสบที่มากหรือนานกว่าปกติเมื่อเทียบกับผู้ป่วยรายอื่น ๆ ที่ผลการเพาะเชื้อปกติ และไม่มีผู้เข้าร่วมการศึกษารายใด มีการติดเชื้อหลังการผ่าตัด (endophthalmitis)

**สรุป:** การใช้ 5% povidone-iodine หยอดตาก่อนเข้ารับการผ่าตัดต่อกระจก ตรวจพบการปนเปื้อนของเชื้อโรคในช่องหน้าม่านตาของผู้ป่วยเป็นจำนวนน้อย ยาวนานนี้อาจจะมีประโยชน์ในการใช้ป้องกันการติดเชื้อในการผ่าตัดต่อกระจก

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