

Surgical Techniques of Cataract Surgery and Subsequent Postoperative Endophthalmitis

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Objectives: To compare the incidence and characteristics of patients with endophthalmitis after extracapsular cataract extraction (ECCE) to those after phacoemulsification

Material and Method: Records of patients receiving intravitreal antibiotic injection to treat endophthalmitis after cataract surgery between Jan 2001 and Dec 2004 were reviewed. Demographic data and other characteristics including associated diseases, details of cataract surgical procedure and intraoperative complication, onset of endophthalmitis after cataract surgery, presenting symptoms and signs of endophthalmitis, how endophthalmitis was managed, causative organisms, duration of hospitalization and results of treatment were collected. This information was compared between those of endophthalmitis patients after ECCE and those after phacoemulsification.

Results: There were 5 cases who developed endophthalmitis after ECCE and 31 cases after phacoemulsification. The incidence was 0.365% after ECCE and 0.279% after phacoemulsification ($p = 0.589$). Visual acuity (VA) before cataract surgery in ECCE group was worse than the phacoemulsification group (median VA: counting fingers vs 6/36, $p = 0.001$). Median onset of endophthalmitis was 8 days after ECCE and 6 days after phacoemulsification. Presenting symptoms and signs were similar. Causative agents were identified in 4 (80%) and 14 (45%) cases in the ECCE and phacoemulsification groups respectively. Gram-positive bacteria were the major cause of infection in both groups. Endophthalmitis caused by *Citrobacter* sp. in ECCE group and enterococcus or streptococcus sp. the phacoemulsification in the group ended up with enucleation or no light perception.

Conclusion: The present study has not demonstrated an apparent difference between endophthalmitis after ECCE and those after phacoemulsification. Endophthalmitis after either procedure can be managed as the same condition.

Keywords: Endophthalmitis, Cataract surgery

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Infectious endophthalmitis is an inflammatory response to infection of the intraocular tissues. It can occur after intraocular surgery or penetrating eye injury that disrupts the integrity of the globe, allowing causative organisms to gain access. Some organisms can occasionally reach the eye through hematogenous spreading from other sources of infection in the body.

Despite its low incidence, endophthalmitis is considered a serious complication after ocular

surgeries owing to potentially vision-threatening consequences. A survey at the Bascom Palmer Eye Institute between 1995 and 2001 demonstrated varying incidence rates of acute-onset postoperative endophthalmitis following various types of intraocular surgery⁽¹⁾. The incidences varied from 0.04% after cataract surgery to 0.2% after glaucoma surgery and after secondary intraocular lens placement. Different surgical procedures were associated with different incidences and clinical outcomes of subsequent developing endophthalmitis.

Since cataract surgery is the most common intraocular procedure performed, it is responsible for

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most of the cases of postoperative endophthalmitis. Surgical techniques recently performed in cataract surgery are mainly extracapsular cataract extraction (ECCE) and phacoemulsification. Distinctions between the two techniques are how to make an incision and get rid of the lens nucleus. These may influence the clinical patterns of endophthalmitis developed after either procedure. Consequently, specific treatment may be required.

Objectives

To define incidences and differences in clinical characteristics between cases developing endophthalmitis after ECCE and those after phacoemulsification.

Material and Method

The department has participated in the Hospital Accreditation Program to raise the standard of patient care and hospital administration. Nosocomial infections, including prophylaxis and treatment, are among the points of concern in this process. Several measures have been developed and implemented to control postoperative infection. Clinical practice guidelines were also developed to suggest how this complication should be managed. Intravitreal antibiotic injection was strongly recommended as an initial treatment for patients developing endophthalmitis following cataract surgery, based on the Endophthalmitis Vitrectomy Study⁽²⁾. The occurrence of endophthalmitis after cataract surgery has been prospectively monitored and recorded since 2001.

The study design was a comparative study. Records of patients receiving intravitreal antibiotic injections to treat endophthalmitis after cataract surgery between January 2001 and December 2004 at Siriraj Hospital, Bangkok, Thailand, were reviewed. The patients who underwent cataract surgery outside Siriraj Hospital were excluded from the present study.

Demographic data and other characteristics, including associated diseases, details of cataract surgical procedure and intraoperative complications, onset of endophthalmitis after cataract surgery, presenting symptoms and signs of endophthalmitis, how endophthalmitis was managed, causative organisms, duration of hospitalization and results of treatment were collected.

The presented patients were divided into 2 groups. The first group included patients who developed endophthalmitis following ECCE and the second group following phacoemulsification. The

information collected was compared between these groups. Fisher's exact test and Mann-Whitney U test were used to verify statistically significant differences for proportion and nonparametric data respectively. The difference was defined as significant when the p value was less than 0.05.

Results

There were 36 eyes of 36 patients who underwent cataract surgery in Siriraj Hospital and subsequently required intravitreal antibiotic injection to treat postoperative endophthalmitis during the study period. These occurred following ECCE in 5 eyes and following phacoemulsification in the other 31 eyes. ECCE and phacoemulsification were concurrently performed on 1,368 and 11,080 eyes respectively. The incidence of endophthalmitis, therefore, was 0.365% after ECCE and 0.279% after phacoemulsification ($p = 0.589$, Fisher's exact test).

Demographic data and details of cataract surgery of both groups are summarized in Table 1. No difference was found between the groups except for visual acuity of patients prior to cataract surgery. The ECCE group had poorer vision than the other.

No intraoperative complication was reported among the cases in the ECCE group. There were intraoperative complications in 5 cases of the phacoemulsification group. Ruptured posterior capsule occurred in 3 cases. The other complications were torn capsulorhexis and subluxation of cataract requiring anterior vitrectomy. The occurrence of intraoperative complication was not significantly different between the groups.

The authors also found no statistical difference in the pattern of endophthalmitis developed after either surgical technique, including clinical presentation, causative organism, vitrectomy requirement and treatment outcome, as shown in Table 2.

Clinical presentations of endophthalmitis in both groups were reduced vision and ocular pain. The median onset of endophthalmitis was 8 days after surgery in the ECCE group and 6 days in the phacoemulsification group.

Positive-culture was found in 4 of 5 cases in the ECCE group and 14 of 31 cases in the phacoemulsification group. Identified causative organisms in the ECCE group included coagulase-negative staphylococcus, methicillin-resistant staphylococcus aureus, citrobacter diversus and penicillium sp. Coagulase-negative staphylococcus was found in 7 cases from the phacoemulsification group, followed by entero-

Table 1. Characteristics of patients before developing endophthalmitis

	ECCE (n = 5)	Phaco (n = 31)	p value
Sex: male/female	1/4	13/18	0.628
Age: mean (SD)	69 (12.1)	64.8 (12.1)	0.480
Range	53-81	35-86	
Associated diseases:			
Diabetes mellitus (%)	3 (60)	10 (32.3)	0.328
Hypertension (%)	2 (40)	6 (19.4)	0.305
Intraoperative complication (%)	0	5 (16.1)	1.0
Antibiotics in irrigating solution (%)	1 (20)	1 (3.2)	0.262
PMMA IOL (%)	5 (100)	17 (54.8)	0.134
Visual acuity: median (range)			
Before cataract surgery	CF (1/60-HM)	6/36 (6/9-HM)	0.001
After cataract surgery	6/18 (6/12-4/60)	6/12 (6/6-1/60)	0.170

ECCE = extracapsular cataract extraction; Phaco = phacoemulsification; PMMA IOL = polymethylmethacrylate intraocular lens; CF = counting fingers; HM = hand motions

Table 2. Pattern of endophthalmitis

	ECCE (n = 5)	Phaco (n = 31)	p value
Eye: right/left	3/2	14/17	0.650
Onset: median (range)	8 (2-37)	6 (1-98)	0.625
Clinical presentation:			
Eye pain (%)	2 (40)	21 (67.7)	0.328
Blurred vision (%)	3 (60)	27 (87.1)	0.186
Hypopyon (%)	2 (40)	14 (45.2)	1.0
Corneal edema (%)	2 (40)	13 (43.3)	1.0
Tapping: vitreous only / both aqueous & vitreous	2/3	22/9	0.307
Cases required vitrectomy (%)	3 (60)	8 (25.8)	0.154
Causative organism:			
Bacteria: gram positive	2 (40)	11 (35.5)	1.0
Bacteria: gram negative	1 (20)	3 (9.7)	0.465
Fungus (%)	1 (20)	0	0.138
Negative culture (%)	1 (20)	17 (54.8)	0.337
Days of hospitalization: median (range)	16 (10-24)	17 (7-51)	0.851
Visual acuity: median (range)			
When developing endophthalmitis	1/60 (6/9-NLP)	CF (6/12-LP)	0.594
At discharge	CF (6/18-NLP)	6/60 (6/9-NLP)	0.367

ECCE = extracapsular cataract extraction; Phaco = phacoemulsification; CF = counting fingers; LP = light perception; NLP = no light perception

coccus sp. and proteus mirabilis each in 2 cases, and streptococcus pneumoniae, streptococcus viridans and nonfermentative gram negative bacillus each in 1 case.

Endophthalmitis caused by citrobacter sp. in the ECCE group ended up with enucleation. Infection in the phacoemulsification group with enterococcus or streptococcus sps. resulted in no light perception.

Discussion

ECCE and phacoemulsification are surgical procedures used to perform cataract surgery but are technically different. The distinction between them is how to manage the lens nucleus. En masse removal of the lens nucleus in ECCE, as opposed to nucleus fragmentation and aspiration in phacoemulsification, determine the size and location of the incision. In ECCE

the curvilinear incision is placed along the superior limbus subtending 150 to 170 degrees and sutured underneath the conjunctiva. A clear corneal incision placed temporally with or without suture is routinely used for phacoemulsification in Siriraj Hospital. Its size is between 3 and 6 mm depending on the intraocular lens used.

A difference in surgical technique suggests different subsequent complications. However, this is not the case for endophthalmitis developed after ECCE compared to that after phacoemulsification. Findings from the present study agreed with previous reports from Australia, Turkey and Canada that the incidences of endophthalmitis after both procedures are similar⁽³⁻⁵⁾. A study in Singapore has shown an association of the phacoemulsification technique with culture-positive endophthalmitis, but not in all endophthalmitis cases⁽⁶⁾.

Initial treatment of endophthalmitis after cataract surgery with intravitreal antibiotic injection is recommended with supporting evidence from the Endophthalmitis Vitrectomy Study. This treatment is not a harmless procedure. The attending surgeons must carefully examine the cases and justify whether the infection is the cause of postoperative inflammation before introducing an intravitreal injection. Therefore, this was considered as a current inclusion criterion.

The clinical patterns of endophthalmitis after both procedures in the present study are alike. The number of cases in the present study was acceptedly small to verify minimal a difference, if one actually existed. Owing to the low incidence of this complication, a multicenter study or a longer period of observation is required to answer this question.

In conclusion, the present study demonstrated no apparent difference in the incidence and clinical pattern of endophthalmitis between those which developed after ECCE and after phacoemulsification. Endophthalmitis following either procedure can be managed under the same conditions.

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การติดเชื้อในตาภายหลังการผ่าตัดต้อกระจกต่างวิธี: เปรียบเทียบลักษณะทางคลินิกและการรักษา

อดิศักดิ์ ตริณวรรตน์, ละอองศรี อัจฉนียะสกุล

การติดเชื้อในตาหลังการผ่าตัดต้อกระจกเป็นโรคแทรกซ้อนที่รุนแรงอาจทำให้ผู้ป่วยสูญเสียการมองเห็นได้ วิธีผ่าตัดต้อกระจกที่นิยมใช้ในปัจจุบัน ได้แก่ extracapsular cataract extraction และ phacoemulsification ความแตกต่างที่เด่นชัดระหว่างทั้งสองวิธีอยู่ที่ขนาดและตำแหน่งของแผล ซึ่งอาจส่งผลกระทบต่ออุบัติการณ์ ตลอดจนลักษณะทางคลินิกและการรักษาหากมีการติดเชื้อแทรกซ้อนหลังผ่าตัด

วัตถุประสงค์: เพื่อศึกษาอุบัติการณ์และเปรียบเทียบลักษณะทางคลินิกระหว่างผู้ป่วยที่เกิดการติดเชื้อแทรกซ้อนในตาหลังผ่าตัดต้อกระจกด้วยวิธี extracapsular cataract extraction และผู้ป่วยที่ผ่าตัดด้วยวิธีสลายต้อด้วยอัลตราซาวด์ (phacoemulsification)

วัสดุและวิธีการ: เก็บข้อมูลผู้ป่วยที่เกิดการติดเชื้อแทรกซ้อนในตาหลังการผ่าตัดต้อกระจกทั้งสองวิธีที่ได้รับการรักษาด้วยการฉีดยาปฏิชีวนะเข้าไปในวุ้นตาระหว่างเดือนมกราคม พ.ศ. 2544 ถึงเดือนธันวาคม พ.ศ. 2547 มาเปรียบเทียบความแตกต่างในเรื่องลักษณะของผู้ป่วย ได้แก่ เพศ อายุ โรคอื่นที่เป็นร่วมด้วย วิธีการผ่าตัดและภาวะแทรกซ้อนขณะผ่าตัดต้อกระจก ระยะเวลาที่เริ่มแสดงอาการติดเชื้อในตา อาการและอาการแสดงทางคลินิกของโรค การรักษาที่ได้รับ ชนิดของเชื้อก่อโรค ระยะเวลาที่พักรักษาตัวในโรงพยาบาลและผลการรักษา

ผลการศึกษา: มีการติดเชื้อหลังผ่าตัดต้อกระจกในผู้ป่วย 5 รายจากจำนวน 1,368 ตาที่ผ่าตัดด้วยวิธี extracapsular cataract extraction คิดเป็นอัตราติดเชื้อร้อยละ 0.365 และอีก 31 รายจาก 11,080 ตาที่ผ่าตัดด้วยวิธี phacoemulsification คิดเป็นอัตราติดเชื้อร้อยละ 0.279 ซึ่งไม่มีความแตกต่างกัน ($p = 0.589$) ผู้ป่วยกลุ่มผ่าตัด extracapsular มีระดับสายตาท่าก่อนผ่าตัด ต่ำกว่ากลุ่มสลายต้อกระจก (median visual acuity: CF vs 6/36, $p = 0.001$) มีพื้นฐานของระยะเวลาที่เริ่มแสดงอาการเป็นเวลา 8 วันหลังผ่าตัดและ 6 วันหลังสลายต้อ ลักษณะทางคลินิกอื่น ๆ ของทั้งสองกลุ่มใกล้เคียงกัน ผู้ป่วย 4 รายในกลุ่ม extracapsular cataract extraction และ 14 รายจากกลุ่ม phacoemulsification สามารถเพาะเชื้อก่อโรคได้ แบคทีเรียกรมบวกเป็นเชื้อที่พบมากที่สุด ในทั้งสองกลุ่ม ผู้ป่วยที่ติดเชื้อ citrobacter, enterococcus และ streptococcus จะมีอาการรุนแรงจนไม่สามารถมองเห็นแสงสว่าง หรืออาจต้องได้รับการผ่าตัดนำลูกตาออก

สรุป: การติดเชื้อแทรกซ้อนในตาหลังการผ่าตัดต้อกระจกในผู้ป่วยที่ผ่าตัดด้วยวิธี extracapsular cataract extraction มีลักษณะทางคลินิกไม่แตกต่างจากกลุ่มผู้ป่วยที่ผ่าตัดด้วยวิธี phacoemulsification ผู้ป่วยสมควรได้รับการดูแลรักษาไปในแนวทางเดียวกันได้
