Original Article

Simultaneous Bilateral Cataract Surgery in General Anesthesia Patients

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Background: The aim of this study was to evaluate the indications, safety, benefits, disadvantages and advantages, and the visual outcomes for simultaneous bilateral cataract surgery (SBCS) under general anesthesia.

Methods: This retrospective case review pertained to a period spanning from June 1998 through June 2005 inclusively, and comprised of 27 consecutive patients (54 eyes) that underwent simultaneous bilateral cataract surgery under general anesthesia at the Kaohsiung Chang Gung Memorial Hospital, Taiwan. Surgery modalities included phacoemulsification, extracapsular cataract extraction, lens aspiration and intraocular lens implantation. Outcome measures included postoperative best correct visual acuity (BCVA) as well as intraoperative and postoperative complication rates. Due to the bipolas distribution of the age, we arbitrarily divided our cases into younger group (Group Y, younger than 20 years old) and older group (Group O, equal to or older than 20 years old).

Results: Thirty-eight of the 54 eyes (60% in the younger group and 76.5% in the older group), featuring measured preoperative and postoperative BSCVA, achieved improved visual acuity following SBCS. Two eyes (5.9% in the older group) demonstrated poorer visual acuity postoperatively than preoperatively. Seven patients (40% in the younger group and 17.6% in the older group) were not able to express VA due to their particular medical conditions such as mental disease and young age. Intraoperative and postoperative complication rates were similar to those cited in previous reports of analogous but unilateral extracapsular surgery and simultaneous bilateral cataract surgery. Endophthalmitis did not arise in any of the eyes operated upon and reported on herein, and no examples of bilateral complications that resulted in visual loss occurred in our patients.

Conclusion: SBCS could be a good choice when cataract surgery needs to be performed under general anesthesia. The relative benefits of SBCS under general anesthesia could eclipse the associated enhanced risks of this surgery.
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Key words: simultaneous bilateral cataract surgery, general anesthesia

From a review of the literature, simultaneous bilateral cataract surgery (SBCS) is controversial, and is not routinely performed in developed countries.[1] The reluctance of many ophthalmologists to consider simultaneous bilateral cataract surgery relates to the fear that such bilateral surgery could result in certain complications which could lead to blindness in both eyes.[2] During recent years, the improved safety and effectiveness of modern cataract surgery suggest that the indications for SBCS should be considered again. In some conditions, general anesthesia is required for cataract surgery even in unilateral surgery. Those patients with bilateral cataracts may receive more benefits than risks in SBCS under general anesthesia. We present our experiences of simultaneous bilateral cataract surgery to assess the relative benefits and risks associated with this surgery.

METHODS

This study incorporated a retrospective review of case records of SBCS from June 1998 through June 2005 inclusively, at the Kaohsiung Chang Gung Memorial Hospital, Taiwan. This retrospective study comprised of 27 patients (54 eyes) that underwent SBCS with intraocular lens (IOL) implantation for all eyes apart from secondary IOL implantation in one eye and only lens aspiration without IOL implantation for two children (4 eyes).

Medical records and data were reviewed including cataract grading, patient medical conditions, indications for general anesthesia, general anesthesia score, surgical types, preoperative visual acuity, postoperative visual acuity, intraoperative complications and postoperative complications. A summary of the data are listed in Table 1 and Table 2. Bilateral surgery was considered for patients only when both eyes suffered from clinically significant cataract but no concurrent ocular conditions such as uveitis, untreated ocular or adnexal infection, corneal dystrophy or uncontrolled glaucoma was present.

Data pertaining to the patients who had bilateral simultaneous extracapsular cataract extraction (ECCE) with IOL implantation, phacoemulsification with IOL implantation, lens aspiration with or without IOL implantation, or those with featured phacoemulsification with IOL implantation in one eye with a simultaneous intraocular procedure for the other eye (ECCE with IOL implantation or secondary IOL implantation) were all collected in our study.

All patients involved in this study underwent general anesthesia. Both eyes were prepared for surgery by applying povidone-iodine solution to the skin of the eyelids, brow, cheek, and nose. Head and body towels were placed in appropriate locations. During simultaneous bilateral cataract surgery, the first eye to be operated on was draped with an eye towel and plastic adhesive drape followed by the surgery. At the end of surgery, subconjunctival steroid and antibiotic medications were administered as appropriate, and the eye was padded. After the first-eye surgery was performed, all surgical staff re-scrubbed and donned fresh gloves and gowns for the second patient eye to be operated upon. A fresh operating table, surgical instruments, irrigating lines, and fluids were used for each eye that was operated on. Povidone-iodine was reapplied to the eyelids and surrounding skin of the second eye, which was then draped with an eye towel as was the case with the first eye. Subsequent to surgery, subconjunctival steroid and antibiotic medications were administered and the second eye was also padded. All patients were examined regarding their ocular condition 1 day following their surgery. Routine follow-up examinations were at 1 and 4 weeks. Topical steroid and antibiotic medications were administered postoperatively. The refraction examination was recorded at the first month after operation.

RESULTS

For the 27 case records identified (54 eyes), 14 patients (51.9%) were women and 13 patients (48.1%) were men. The mean patient age was 44.6 years (range, 4 months to 90 years).

Due to the bipolar distribution of the ages (Table 1), we arbitrarily divided our cases into younger group (Group Y, younger than 20 years old) and older group (Group O, equal to or older than 20 years old). The number of patients was 10 (37%) in Group Y and 17 (63%) in Group O, respectively.

Almost all of the patients (26/27) received surgery under general anesthesia due to various systemic conditions, including age younger than 20 years (n = 10, 37%), pulmonary disease (e.g.: asthma or COPD) (n = 4, 14.8%), mental disease (Pakinsonism, cerebral palsy, mental retardation, or demen-

Table 1. Clinical Summary of 27 Patients Who Received SCBS Under G/A

Patient No.	Age	ASA score	Surgeon grade	Cataract grade R/L	Pre-op. oph. disease R/L	Surgical type R/L	Indication for general nesthesia
1	72 y/o	3	VS	N3/N3	ARMD/ARMD	PI/PI	COPD
2	80 y/o	3	VS	P3/P3	No/No	PI/PI	Pakinsonism
3	58 y/o	2	VS	N4/N1,C4	PDR/PDR	EI/EI	PDR[‡]
4	63 y/o	3	VS	N4,P4/N3,P4	BDR/BDR	EI/PI	Spondyolysis
5	22 y/o	3	VS	N4,P3/N4,P3	ET/ET	PI/PI	Mental retardation
6	57 y/o	3	VS	N4,P3/N4,P3	No/No	PI/PI	Neurosis
7	85 y/o	3	Resident	N4,P3/N4,P2	No/No	EI*/PI	Alzheimer's disease
8	16 y/o	3	VS	P3/P3	No/No	PI/PI	Child
9	15 y/o	2	VS	P4,C3/P4,C3	No/No	PI/PI	Child
10	14 y/o	1	VS	P3,C3/P4,C3	No/No	EI/EI	Child
11	82 y/o	2	VS	N6,P4,C4/N6,P5,C5	Entropion/Entropion	PI/PI	Neurosis
12	67 y/o	3	VS	N5,P4,C4/N5,P4,C4	No/N	PI/PI	COPD
13	60 y/o	3	VS	N4,P3/N4,P3	RP/RP	EI/EI	Pakinsonism
14	72 y/o	4	VS	N5/N6	No/No	PI/PI	Spondyolysis
15	85 y/o	3	VS	N3,P2/N4,P2	No/No	PI/PI	COPD
16	75 y/o	4	VS	N5/N5	No/No	EI/II	Dementia
17	43 y/o	3	VS	N5/N5	RD s/p operation/No	PI/PI	Cerebral palsy
18	9 y/o	1	VS	P3,C4/P3,C4	Amblyopia/Amblyopia	PI/PI	Child
19	76 y/o	3	VS	N5/N5	No/No	PI/PI	Mental retardation
20	46 y/o	3	VS	Aphakia/N1,P3,C2	Cataract[†]/No	SI/PI	Mental retardation
21	17 m/o	1	VS	N4/N4	Exotropia/Exotropia	LA/LA	Child
22	6 m/o	1	VS	N3,P3,C3/P4	Nystagmus/Nystagmus	LAI/LAI	Child
23	5 m/o	1	VS	N3,P3,C4/N3P3C4	No/No	LA/LA	Child
24	90 y/o	3	VS	N4,P3/N3,P4	ARMD/ARMD	EI/EI	COPD
25	2 y/o	1	VS	N3,P3,C3/N3,P3,C3	No/No	LAI/LAI	Child
26	6 y/o	1	VS	C2/C2	Amblyopia/Amblyopia	LAI/LAI	Child
27	7 y/o	1	VS	P4,C2/P4,C2	Amblyopia/Amblyopia	LAI/LAI	Child

Abbreviations: ASA score: American Society of Anesthesia score; oph.: ophthalmology; R: right eye; L: left eye; y/o: year old; m/o: month old; VS: visiting stuff; N: nuclear sclerosis; P: posterior subcapsular opacity; C: cortical opacity; ARMD: aged related macular degeneration; PI: phacoemulification and posterior lens implantation; PDR: proliferative diabetic retinopathy; EI: extracapsular cataract extraction and intraocular lens implantation; BDR: background diabetic retinopathy; RP: retinitis pigmentosa. II: intracapsular cataract extraction and intraocular lens implantation; SI: secondary intraocular lens implantation; LA: lens aspiration; LAI: lens aspiration and intraocular lens implantation; COPD: chronic obstructive pulmonary disease; EI*: extraction and anterior intraocular lens implantation; Cataract[†]: Traumatic cataract after intracapsular cataract extraction; PDR[‡]: a case of dense cataract (OU) and PDR (OU). Suspect vitreous hemorrhage (OD), so ECCE + IOP + TPPV arranged under G/A. After ECCE (OD), clear vitreous was noted (OD), so stop TPPV and perform ECCE + IOLO in the another eye (OS).

tia) (n = 8, 29.6%), neurosis (n = 2, 7.4%) and spinal disease (Osteoarthritis) (n = 2, 7.4%) (Table 1). Only one patient without systemic disease received cataract surgery and vitrectomy in the right eye under general anesthesia due to vitreous hemorrhage. After cataract surgery was performed, clear vitreous was noted and vitrectomy was discontinued in the right eye. Then, cataract surgery was performed in the left eye.

A summary of the general medical characteris-

tics of patients included in the study is illustrated in Table 3. The preoperative American Society of Anesthesia scale (ASA scale) of patients is revealed in Table 4. The proportion of ASA Class-3 or greater was 94% in Group O and zero in Group Y, respectively (Table 4). The proportion of the lens-opacity grade 4 or greater was about 74% (Table 5). Only one eye featured aphakia as a preoperative condition, which we believe was due to some previous trauma (Table 6).

Table 2. Clinical Summary of Twenty-seven Patients Receipt SCBS Under G/A

Patient No.	Intraop. C R/L	Postop. C R/L	Preop. VA/Postop. VA R/L	R/L	Follow-up period (months)
1	No/No	No/No	0.1/0.05	0.5/0.3	53
2	No/No	No/No	0.1/CF25cm	0.3/CF70cm	2
3	No/No	No/No	HM10cm/CF15cm	0.3/0.3	12
4	No/No	No/No	HM10cm/0.1	0.5/0.4	1
5	No/No	No/No	+0.05D/+0.17D§	Can not express**	3
6	No/No	No/No	0.01/0.0	0.4/0.5	2
7	*/No	Hyphema(†)/CME	HM10cm/0.06	LS:+/CF20cm	1
8	No/No	No/No	0.1/0.1	0.6/0.5	5
9	No/No	No/No	0.3/0.05	1.0/1.0	4
10	No/No	PC opacity/PC opacity	0.07/0.2	0.6/1.0	3
11	No/No	No/No	HM10cm/0.03	0.1/0.1	1
12	No/No	PC opacity/PC opacity	HM10cm/HM10cm	0.4/ 0.6	9
13	No/No	No/No	0.04/0.02	0.4/0.4	7
14	No/No	No/No	0.05/0.0	0.4/0.1	1
15	*/No	PC opacity/PC opacity	0.1/0.1	0.5/0.3	2
16	No/PC rupture	PC opacity/Hyphema	CF20cm/CF20cm	0.1/0.1	2
17	No/No	No/No	CF30cm/CF1m	0.1/0.1	1
18	‡/‡	No/No	0.05/0.2	0.2/0.4	1
19	No/No	No/No	0.34D/-0.41§	Can not express**	1.5
20	No/No	No/No	0.35D/-0.50§	Can not express**	32
21	No/No	PC opacity/No	Can not express**	+15.50D/+16.5DⅡ	16
22	‡/‡	PC opacity/No	0.28D/-0.05§	Failure¶/-0.75DⅡ	5
23	No/No	PC opacity/PC opacity	Can not express**	+17.50D/+16.75DⅡ	6
24	No/No	No/No	CF30cm/0.05	0.3/0.1	3
25	No/No	PC opacity/PC opacity	+0.12D/+0.18D§	0.50D/+3.00DⅡ	12
26	No/No	No/No	0.3/0.3	0.7/0.8	3
27	No/No	PC opacity/PC opacity	0.02/0.05	0.5/0.5	2

Abbreviations: C: complication; Intraop.: intraoperative; Postop.: postoperative; Preop.: preoperative; VA: visual acuity; R: right eye; L: left eye; CF: counting finger; HM: hand motion; PC: posterior capsule; LS: light sense; CME: cystoid macular edema; *: posterior capsule rupture and vitreous loss; †: hyphema, striated cornea; ‡: anterior capsule laceration; §: can not express VA and instead of target refractive state; II: can not express VA and instead of refractometer (spherical equivalent); ¶: failure for refractometer due to posterior capsule opacity; **: no refractometer data.

The type of operation performed for each eye, and the grade of the surgeon conducting the procedure (almost all were visiting surgical staff; 96.2%) are listed in Table 7. The surgical procedures included ECCE (11 eyes), phacoemulsification (28 eyes), ICCE (1 eye), phacoemulsification combined with anterior vitrectomy (1 eye), secondary implantation associated with aphakia (1 eye) and lens aspiration combined with anterior vitrectomy (12 eyes) in total (Table 7). The surgical procedures of the lens aspirations were all perform in the Group Y (12 eyes; 60%) (Table 7).

The details of minor intraoperative complications such as miosis, bulging iris and iris trauma were not recorded in the individual patient's medical charts, although the details of more-serious complications such as anterior capsule rupture (20% in Group Y, and 0% in Group O, respectively), posterior capsule rupture (0% in Group Y, and 8.8% in Group O, respectively) and vitreous loss (0% in Group Y, and 5.9% in Group O, respectively) were recorded. The complication rate for surgeons that were classified as Visiting Staff was 6/52 (11.5%) and the corresponding figure for senior residents was 1/2 (50%). The complication rate for ECCE was 1/11 (9.0%) and the corresponding figure for phacoemulsification was 3/29 (10%). The complication rate was 20 percent in the Group Y and 8.8 percent in the Group O, respectively (Table 7).

Postoperative complications included posterior

Table 3. Preoperative Medical Conditions

Preoperative medical conditions	Group Y (n = 10)	Group O (n = 17)
Mental retardation	0 (0%)	3 (17.6%)
Dementia	0 (0%)	2 (11.8%)
Cerebral palsy	0 (0%)	1 (5.9%)
Pakinsonism	0 (0%)	2 (11.8%)
Emotion disorder	0 (0%)	2 (11.8%)
Osteoarthritis	0 (0%)	2 (11.8%)
Old MI	0 (0%)	1 (5.9%)
COPD	0 (0%)	4 (23.5%)
DM	1 (0%)	1 (5.9%)
Children	10 (100%)	0 (0%)
ESRD	1 (10%)	0 (0%)

Abbreviations: Group Y: younger group; Group O: older group; DM: diabetes mellitus; ESRD: end stage of renal disease; COPD: chronic obstructive pulmonary disease.

Table 4. The American Society of Anesthesia Scale (ASA)

ASA class	Group Y (n = 10)	Group O (n = 17)
1	8 (80%)	0 (0%)
2	2 (20%)	1 (5.9%)
3	0 (0%)	14 (82.3%)
4	0 (0%)	2 (11.8%)
5	0 (0%)	0 (0%)

Abbreviations: Group Y: younger group; Group O: older group.

The American Society of Anesthesia physical status scale grades preoperative risk factors as follows:

Class 1: healthy patient

Class 2: mild systemic disease without functional limitation

Class 3: severe systemic disease with definite functional limitation

Class 4: severe systemic disease that is a constant threat to life

Class 5: moribund patient who is unlikely to survive 24 hours with or without operation

Table 5. The Percentage of The Grade of Lens Opacity

Grade of lens opacity	Number (Percentage)
N 3	10 (18.5%)
N 4	14 (25.9%)
N 5	9 (16.7%)
N 6	3 (5.6%)
Greater than N 4	36 (48%)
C 3	7 (12.9%)
C 4	8 (14.8%)
C 5	1 (1.86%)
Greater than C 4	9 (16.7%)
P 3	21 (38.9%)
P 4	12 (22.2%)
P 5	1 (1.86%)
Greater than P 4	13 (24%)

Abbreviations: N: Nuclear sclerosis; C: Cortical opacity; P: Posterior subcapsular opacity.

Table 6. Preoperative Ocular Conditions

Preoperative Ocular Conditions	Group Y (n = 20)	Group O (n = 34)
ARMD	0 (0%)	4 (11.8%)
PDR with VH.	0 (0%)	2 (5.9%)
BDR	0 (0%)	2 (5.9%)
Retinitis pigmentosa	0 (0%)	2 (5.9%)
RD s/p TPPV + SB + Silicone oil + Cryopexy	0 (0%)	1 (2.9%)
Traumatic cataract s/p ICCE + AC vitrectomy	0 (0%)	1 (2.9%)
Nystagmus	2 (10%)	0 (0%)
Microphthalmia	2 (10%)	0 (0%)
Amblyopia	6 (30%)	0 (0%)

Abbreviations: Group Y: younger group; Group O: older group; ARMD: age related macular degeneration; PDR: proliferative diabetic retinopathy; VH: vitreous hemorrhage; BDR: background diabetic retinopathy; RD: retinal detachment; TPPV: trans pars plana vitrectomy; SB: scleral buckle; ICCE: Intracapsular cataract extraction; AC: anterior chamber.

capsule opacity (0% in Group Y, and 14.7% in Group O, respectively), hyphema (0% in Group Y, and 5.9% in Group O, respectively), striated cornea (0% in Group Y, and 5.9% in Group O, respectively), cystoid macular edema (0% in Group Y, and 2.9% in Group O, respectively) and posterior capsule opacity (50% in Group Y, and 14.7% in Group O, respectively) (Table 8). No postoperative endophthalmitis was observed for participants included in our study as was the case for postoperative retinal detachment.

Preoperative and postoperative visual acuity (VA) were recorded and listed in Table 2. Best corrected visual acuity (BCVA) of 6/12, or better, was seen in nine eyes (45%) in Group Y and seven eyes (20.6%) in Group O, respectively. In Group O, 26 eyes (76.5%) revealed improved VA postoperatively and 12 eyes (60%) showed improvement in Group Y respectively. In Group O, two eyes (5.9%) revealed poorer visual acuity and no poorer visual acuity was noted in Group Y. In Group O, three patients (6 eyes; 17.6%) could not express VA due to their medical conditions and four patients (8 eyes; 40%) could not

Table 7. Type of Operation, Grade of Surgeon and Intra-operative Complications

Intra-operative complications	Surgeon grade		Type of operation				Group Y	Group O
	VS	R	EI	PI.	LA*	Others†		
None	46	1	10	26	10	1	16	31
PC rupture with VL	1	1	1	1	0	0	0	2
PC rupture without VL	1	0	0	0	0	1	0	1
AC laceration	4	0	0	2	2	0	4	0
Group O	32	2	9	23	0	2		
Group Y	20	0	2	6	12	0		

Abbreviations: VS: Visiting stuff; R: Resident; EI: extracapsular cataract extraction and intraocular lens implantation; PI.: phacoemulifi-cation and intraocular lens implantation; LA: lens aspiration; Group Y: younger group; Group O: older group; PC: posterior capsule; AC: anterior capsule; VL: vitreous loss; *: In the 12 eyes, 10 eyes were under lens aspiration + anterior vitrectomy + PICOL implantation and the other 2 eyes were under only lens aspiration + anterior vitrectomy; †: Intracapsular cataract extraction and intraocular lens implantation in one eye and anterior intraocular lens implantation secondary implantation in one eye.

Table 8. Post-operative Complication

Post-operative complication	Group Y (n = 20)	Group O (n = 34)
PC opacity	10 (50%)	5 (14.7%)
Hyphema	0 (0%)	2 (5.9%)
Striate cornea	0 (0%)	2 (5.9%)
CME	0 (0%)	1 (2.9%)

Abbreviations: Group Y: younger group; Group O: older group; PC opacity: posterior capsule opacity; CME: cystoid macular edema.

Table 9. Visual Outcomes

Visual outcome	Group Y (n = 20)	Group O (n = 34)
Better post-op. VA	12 (60%)	26 (76.5%)
Poor post-op. VA	0 (0%)	2 (5.9%)
BCVA of 6/12, or better	9 (45%)	7 (20.6%)
Can not express VA	8 (40%)	6 (17.6%)

Abbreviations: Group Y: younger group; Group O: older group; VA: visual acuity; post-op.: postoperative.

express VA due to young age in Group Y, respective-ly (Table 9). Target refractory status and refraction data were recorded for those who could not express VA (Table 2). The mean length of follow up was 7.1 months (range, 1 ~ 53 months) (Table 2).

DISCUSSION

To the best of our knowledge, SBCS is not advised as a routine procedure in cataract surgery,[3] however some authors have advocated the practice, suggesting that such the surgery did not lead to an increased incidence of serious intraoperative or post-operative complications, and patient visual-acuity results postoperatively were, on average, very good.[3,4] It appears that there is a lack of published data pertaining to simultaneous bilateral cataract surgery for Taiwanese patients, and surgeons per-forming the procedure appears to be obliged to make their results available to the relevant medical com-munity. In order to allow the ophthalmic community to better assess data relating to the indications, risks

and benefits, thus, we present our department's expe-riences with regards to simultaneous bilateral cataract surgery under general anesthesia.

The patients in our study were not suitable for local anesthesia due to such medical conditions listed in Table 1. Under the conditions, general anesthesia was necessary even for unilateral cataract surgery. The medical conditions included young age, mental diseases, and neurosis that caused patients not to cooperate and pulmonary diseases (Asthma, COPD) that caused patients to cough on the surgical table and spinal disease (Osteoarthritis) that caused patients not to lie down on the surgical table.

The relative benefits of SBCS under general anesthesia appear to be divided into three separate categories - medical, social, and economic.[2] Although the conditions may be different in different countries, we describe the possible benefits in our country.

The medical advantages include the reduction in morbidity and mortality rates during additional gen-eral anesthesia; improved stereopsis, binocular visual

acuity, contrast sensitivity thresholds, and less glare disability during the postoperative period compared with patients awaiting cataract surgery for their second eye.[5] It is our intension that these factors could contribute to an overall decrease in the number of accidents experienced by patients postoperatively.[6] The social advantages of SBCS include single admission to the hospital, a reduction in the number of outpatient visits required per patient, and a shorter overall convalescence.[2] In Taiwan, it appears that the relative accessibility of ophthalmologists is quite good, although most ophthalmologists' practices appear to be located in the larger cities and patients who want to undergo cataract surgery need to go to an appropriate city for medical attention. The average cost of a course of cataract surgery appears to be of the order of five times the OPD from pre-operation to post-operation follow-up states, per eye. It is typically very inconvenient for those people who live in regional areas that are poorly serviced by ophthalmologists (e.g. in the mountainous regions of Taiwan). Thus, SBCS could be considered for such patients. At most, such patients would only need to go back to the same hospital for postoperative follow up once or twice. Further, the relative accessibility of medication can be largely improved for patients undergoing SBCS as opposed to patients undergoing two separate surgical procedures.

The economic advantages of SBCS over its double-surgery alternative include avoiding the cost of two periods of hospitalization and two occasions for the delivery of general anesthesia for patients unsuitable for local anesthesia, also reducing the time, and thus cost, necessary for outpatient follow up. In addition, further economic benefits of SBCS include the need for only one pair of new glasses, shorter waiting lists for surgery and necessary clinic visits, accompanying friends and relatives need to take less time off work, and an overall reduced demand to be placed upon hospital transport services.

The relative medical risks of SBCS could be considered into intraoperative complications (posterior-capsule rupture, vitreous loss), and postoperative complications (endophthalmitis, corneal decompensation, posterior-capsule opacity and cystoid macular edema) (Tables 7 and 8). From our study, the rate of intraoperative complications such as posterior capsule rupture was at around 5.6% (0% in Group Y and 8.8% in Group O, respectively). The rate for vitreous loss was at about 3.7% (0% in Group Y and 5.9% in Group O, respectively). According to previous studies on immediately sequential cataract surgery (ISCS), the rates of posterior capsule rupture were around 5%, 2.4%, 0.8%, 0%, respectively and the corresponding figures for vitreous loss was 3%, 2.4%, 0%, respectively[3,7-9] which were similar to our study. These figures compare favorably with the national rate in the United Kingdom of the posterior capsular rupture and vitreous loss of 4.4% seen during unilateral cataract extraction surgery,[10] In addition, previously published rates of posterior-capsular rupture and vitreous loss during phacoemulsification were 1.4-5.2% and 0.7-2.3%, respectively, and during ECCE the rates were 0-8% and 0.09-3.3%, respectively.[11-15] The rates for intraoperative and postoperative complications of the SBCS seem to be an analogy to the unilateral cataract extraction surgery.

The proportion of ASA class-3 or greater patients participating in our study was around 94% in Group O. According to the 1995 study Beatty et al. conducted in the Alexandra Hospital, Redditch, UK.[2] An ASA grade of 3 or greater occurred for about 26.4% of the eyes. The proportion of ASA score in our study was higher than the analogue studies. This was also the reason that we chose to perform SBSC under general anesthesia. However, the proportion of ASA class 3 or greater in Group Y was 0%. The reason we performed cataract surgery under general anesthesia in Group Y was due to poor cooperation instead of the poor medical conditions found in Group O.

The extent of existing lens opacity, preoperatively, may affect the difficulty of the surgery for cataract patients, this thus potentially lead to an enhanced rate of intraoperative complications. The proportion of lens opacity in our study featured a high grade and was around 74% (Table 5), although the rate of intra- and postoperative complications such as capsule rupture either with or without vitreous loss, did not appear to be high for our study. The level of intraoperative complications should, logically, also be affected by the involved surgeon's level of expertise. For our study, the complication rate for visiting surgical staff was 11.5%, whereas the complication rate for senior (surgical) residents was 50%, although the sample size (n = 2) was rather small (Table 7).

A major reason for the reluctance of many surgeons to undertake simultaneous bilateral cataract surgery appears to be the fear of resultant bilateral endophthalmitis.[3] From our study, the rate of postoperative endophthalmitis was zero, although acknowledging our rather small sample size (n = 54), we can not really form any conclusions about the risk of post-operative endophthalmitis following SBCS surgery. According to the 2001 reports of Smith and Liu who reviewed the relevant international literature pertaining to SBCS (a total of 2859 patients from 1995 through 1998), the rate of postoperative endophthalmitis was 0.14%,[4] although none of the operations was bilateral. For unilateral cataract surgery, the reported rates of postoperative endophthalmitis ranged from 0% to 1.89%.[16] In another publication, the rates of postoperative endophthalmitis following uncomplicated ECCE, complicated ECCE, uncomplicated phacoemulsification, and complicated phacoemulsification were 0.18%, 1.10%, 0.18%, and 2.42%, respectively.[17-21] From a review of such figures, it appears that the rate of postoperative endophthalmitis as revealed by our investigation was not higher following SBCS than was the figures following unilateral cataract surgery.

Final visual acuity, postoperatively, for our study participants revealed that 38 eyes featured an overall acuity improvement following surgery (60% in Group Y and 76.5% in Group O, respectively), and two eyes revealed decreased visual acuity (0% in Group Y and 5.9% in Group O, respectively) due to the presence of cystoid macular edema postoperatively (Table 9). According to the results of the study by Ramsay et al, 75% of eyes (total 444 eyes) featured an improved visual acuity postoperatively,[2] which is a result similar to ours. In our study, 14 patients (40% in Group Y and 17.6% in Group O, respectively) were unable to complete a vision examination due to various medical conditions, or because of young age. Although we noted an enhanced grade of lens opacity (74% Grade 4 or greater; Table 5) and poor medical conditions for patients in our study, the final postoperative visual acuity level for our eyes was not below the standard for unilateral cataract surgery. However, we consider that SBCS should not be performed as a routine cataract surgery but only in conditions under general anesthesia.

Comparing the surgical indications for general anesthesia between the two groups, the major indications were poor cooperation (100%; children) in Group Y and poor medical conditions (94%; ASA class-3 or greater) in Group O. The proportions of lens aspirations were 60% in Group Y and 0% in Group O (Table 7). The posterior capsular opacity rates were 50% in Group Y and 14.5% in Group O (Table 8). The lack of a statistical data obtained between the two groups was due to the small sample size and individual variations.

The results of our limited sample-size study without control groups have demonstrated the relative safety and efficacy and indications of simultaneous bilateral cataract surgery. It seems to be a useful option for cataract patient for whom surgery is necessary to be conducted under general anesthesia. However, the results of this study do not extrapolate to all cases with SBCS under general anesthesia. Further prospective control studies with large sample sizes are needed to evaluate the safety of SBCS under general anesthesia.

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全身麻醉下雙眼同時白內障手術

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背 景： 評估其雙眼同時白內障手術之病人其適應性、安全性、利弊及視力。

方 法： 自 1998 年至 2005 年，回顧分析所有雙眼同時白內障手術之病人。記錄其術前狀況、手術方法、術中及術後的併發症，以及視力之預後。

結 果： 總共二十七位病人，五十四隻眼睛，三十八隻眼睛 (77.5%) 術後比術前視力進步，二隻眼睛 (3.7%) 術後比術前視力退步，十四隻眼睛 (26%) 因內科疾病而無法表達。術中及術後的併發症比率類似單眼同時白內障手術，且無眼內炎及雙眼併發症致失明之病例。

結 論： 雙眼同時白障手術對必須全身麻醉的病人來說，是一種不錯的選擇，且其手術的優點比缺點多。

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關鍵詞： 雙眼同時白內障手術，全身麻醉