

Benefit to patients of bilateral same-day cataract extraction: Randomized clinical study

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PURPOSE: To compare patients' self-assessed visual function after bilateral surgery performed on the same day with visual function after surgery in 1 eye at a time.

SETTING: Department of Ophthalmology, Blekinge Hospital, Karlskrona, Sweden.

METHODS: Patients with bilateral cataract were assigned randomly to 2 groups, patients having bilateral surgery on the same day and patients with 2 surgeries done 2 months apart. Both groups were examined before and 2 months and 4 months after surgery. All patients completed the Catquest questionnaire at each ophthalmic examination.

RESULTS: Until both eyes were operated on, patients having surgery in 1 eye had significantly more difficulties performing daily life activities ($P < .001$) and a worse binocular contrast sensitivity ($P < .01$) than patients who had bilateral surgery on the same day. Four months after surgery of both eyes in both groups, there was no difference in visual function.

CONCLUSIONS: Bilateral cataract surgery on the same day allowed rapid rehabilitation of the patient and helped avoid suboptimal visual function in daily life while waiting for second-eye surgery. However, there was no extra long-term benefit of self-assessed visual function compared with cataract surgery in 1 eye at a time.

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Patients with bilateral cataract usually benefit from having bilateral cataract extraction. Studies have shown that second-eye cataract surgery adds quality of life (QoL) to such patients.^{1,2} A bilateral cataract extraction can be performed sequentially with a varying interval between the 2 surgeries, so that some patients receive immediate sequential cataract surgery (ISCS), whereas others have delayed sequential cataract surgery (DSCS) with an interval of weeks or months between the surgeries. Immediate sequential cataract surgery has been described as a favorable surgical approach in selected cases.³⁻⁵ More than 6000 cases without

serious complications have been reported in the literature since 1995.⁶ The advantages of this surgical strategy are evident and include faster rehabilitation of the patient and lower costs for the patient and the society. The disadvantage is risk for a serious bilateral complication such as corneal decompensation, macular edema, or endophthalmitis.⁵ However, this may also be the outcome of surgery in 1 eye at a time. The risk of bilateral endophthalmitis in ISCS is extremely small, although an outbreak of endophthalmitis caused by contaminated equipment has been reported⁷ so the risk is not negligible. Another disadvantage of ISCS is loss of the possibility of recalculating the target refraction and changing the lens, which is available after first-eye surgery.³

One important outcome measure of cataract surgery is the patient's self-assessed visual function and satisfaction with vision.⁸ In cases of cataract in both eyes, the best results have been achieved after surgery in both eyes. However, it is not clear whether ISCS adds an extra benefit to the patient compared with DSCS with a short interval between the surgeries except during the delay until the second-eye surgery is performed.

The aim of this study was to compare self-assessed visual function between 2 groups of patients randomly

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selected to surgery in both eyes on the same day or sequential surgery with a 2-month interval between the first-eye surgery and the second-eye surgery.

PATIENTS AND METHODS

Patients were recruited from the waiting list for cataract surgery at the Department of Ophthalmology, Blekinge Hospital, Karlskrona, Sweden. The inclusion criteria were cataract with need for surgery in both eyes, no other sight-threatening eye diseases in either eye, an axial length of 21 to 27 mm, and ability to speak Swedish. Exclusion criteria were surgical complications during first-eye surgery (eg, rupture of the posterior capsule, vitreous loss, very prolonged surgery because of surgical difficulties), general diseases that could affect the immune system, and actual infections. All those recruited to the study were required to review and sign informed consent documents, which were approved by the Ethical Committee of University of Lund, Sweden, according to the Declaration of Helsinki.

The presurgical examination was performed by 1 of 2 experienced registered ophthalmic nurses (S.A., M.N.) and 1 of 2 experienced cataract surgeons (M.L., B.Å.). The surgery and follow-up examinations were performed by the same surgeon and ophthalmic nurse.

The presurgical examination included a slitlamp examination and funduscopy. The following measurements were made: visual acuity, refraction, near vision, applanation tonometry, keratometry and axial length, contrast sensitivity (using Pelli-Robson charts at 1 m⁹⁻¹¹), and stereoscopic vision (TNO test). The patients were assigned randomly to ISCS or to DSCS with an interval of 2 months between the surgeries. The visual examination was repeated 2 months after the first surgery (after first-eye surgery in the DSCS group and both-eye surgery in the ISCS group) and 4 months after the last surgery in both groups. The study closed 4 months after the last surgery in each patient. The patients' self-assessed visual function was studied using the Catquest questionnaire,^{12,13} which contains questions about daily life activities and difficulties in performing daily life activities; cataract symptoms; and satisfaction with vision, work, car driving, and ability of independent living. All patients completed the Catquest questionnaire before surgery and at the 2 postsurgical examinations. The study design and time schedule are shown in Figure 1.

The surgery was carried out as follows: the pupil was usually dilated with eyedrops (cyclopentolate and phenylephrine)

administered at home by the patient before the surgery, topical anesthesia (oxybuprocaine drops), a 2.75 mm corneal (M.L.) or corneoscleral (B.Å.) tunnel incision plus a second paracentesis, phacoemulsification with implantation of a foldable hydrophobic acrylic intraocular lens using an injector, and 1 mg cefuroxime instilled intracamerally at the end of surgery; no stitches and no shield were used. Outpatient surgery was performed in all cases. Postoperatively, patients were given steroid drops (dexamethasone) 3 times a day for 1 week and twice a day for the following 2 weeks.

In the case of ISCS, the patient stayed on the operating table while the nurse prepared a separate new set of surgical instruments, irrigating lines, and fluids, but using the same phaco machine. The nurse and surgeon prepared for the second operation by resterilizing their hands and regowning.

RESULTS

Ninety-six patients were recruited to the study. Their preoperative demographic data are shown in Table 1. There was no significant difference in age (P = .966, Student *t* test) or in sex distribution (P = .973, chi square) between the 2 groups of patients.

Eight cases were excluded during the study, 5 in the DSCS group and 3 in the ISCS group. In 3 cases, problems (technical difficulties because of a small pupil in 1 case, posterior capsule rupture in 2 cases) occurred during first-eye surgery, and the patients were therefore excluded from the study. Five cases were excluded for other reasons (1 patient died, 1 patient did not want to complete the study, 2 patients were excluded for administrative reasons related to a strike, and 1 patient had postoperative iritis after first-eye surgery). There were no significant differences between the excluded cases and the study population (in terms of age, visual acuity, or Catquest ranking scores) except that 7 excluded cases were women.

Before surgery there was no difference in visual acuity between the 2 groups (Table 2). Two months after first-eye surgery in the DSCS group and both-eye surgery in the ISCS group, there was a significant difference in visual acuity

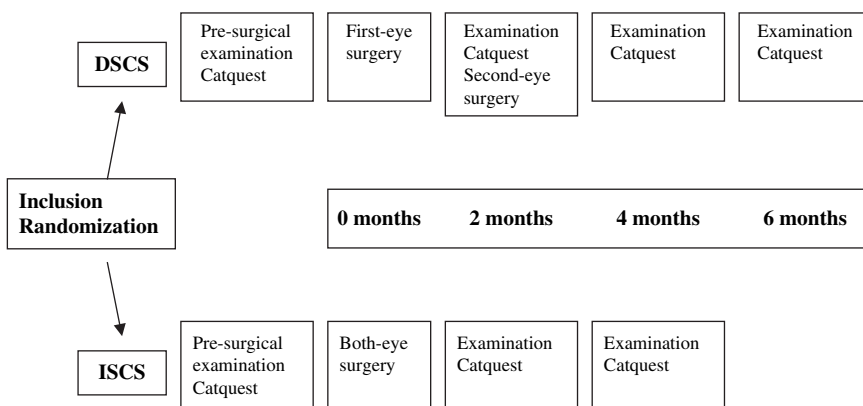


Figure 1. Schematic drawing of the study design and time schedule.

Table 1. Demographic data in the 2 study groups.

	ISCS	DSCS
Number	50	46
Mean age (y)	72.5	72.5
Women (%)	54.0	54.3

DSCS = delayed sequential cataract surgery; ISCS = immediate sequential cataract surgery

between the groups; however, 4 months after the last surgery in both groups, this difference had disappeared, (Table 2).

There were no significant differences in stereoscopic vision or binocular contrast sensitivity before surgery between the ISCS and DSCS groups. Two months after surgery, binocular contrast sensitivity was significantly better in the ISCS group than in the DSCS group, and stereoscopic vision was equal. Four months after the last surgery, the difference had vanished and both groups showed equal results (Table 3).

The refractive outcome of surgery was equal in the 2 groups. Table 4 shows the difference in refraction (spherical equivalent) between the right and left eye 2 and 4 months after surgery.

Two months after first-eye surgery in the DSCS group and both-eye surgery in the ISCS group, there was a significant difference in total disability score sum, cataract symptoms, satisfaction with vision, and difficulties in car driving between the groups (Table 5). By 4 months after the second-eye surgery in both groups, this difference had disappeared (Table 5).

The number of car drivers before surgery was 31 in the DSCS group and 35 in the ISCS group. Before the surgery, 19% in the DSCS group and 17% in the ISCS group reported they could drive without vision-related difficulties. Two

Table 2. Visual acuity before surgery and 2 and 4 months after surgery.

Examination	Right Eye			Left Eye		
	ISCS	DSCS	P Value [‡]	ISCS	DSCS	P Value [‡]
Median VA						
Before surgery	0.6	0.6	.847	0.6	0.6	.608
After 2 mo*	1.0	0.8	<.001	1.0	0.8	<.001
After 4 mo [†]	1.0	1.0	.551	1.0	1.0	.489
VA ≥ 0.8, eyes %						
Before surgery	26	19.6		36	26.1	
After 2 mo*	91.5	51.2		85.1	55.8	
After 4 mo [†]	91.3	97.3		91.3	97.2	

DSCS = delayed sequential cataract surgery; ISCS = immediate sequential cataract surgery; VA = visual acuity (decimal)

*Only 1 eye (left or right) operated on the DSCS group; both eyes operated on the ISCS group

[†]Both eyes operated on both groups

[‡]Mann-Whitney U test

months after the first surgery, these figures were 43% and 68%, respectively. Four months after surgery in both eyes, 78% in the DSCS group and 72% in the ISCS group stated that they could drive a car without vision-related difficulties.

In the DSCS group, 15 patients had anisometropia of 2.0 diopters (D) or more 2 months after first-eye surgery. In this group of 15 patients, the median total disability score sum was 11 (mean 11.73) after 2 months compared with 10 (mean 10.56) in the group of patients with less difference in refraction between the eyes. The difference between the groups was not significant ($P = .140$, Mann-Whitney U test).

During the 4-month follow-up, a few complications occurred. One day after surgery, 2 eyes had high intraocular pressure (<30 mm Hg) and 1 eye had corneal edema. At 2 months, 1 eye had postoperative iritis. At the 4-month follow-up, 1 eye had a vitreous detachment and 2 eyes (in the same subject) showed the beginnings of posterior capsule opacification. There were no further complications during the 4-month follow-up period.

DISCUSSION

Our findings show that ISCS restored self-assessed visual function faster than DSCS with 2 months between the surgeries. The study also found that 4 months after surgery for cataract in both eyes, there was no difference in self-assessed visual function between the 2 groups of patients. Therefore, during the period between the first-eye and the second-eye surgery in the DSCS group, patients had a poorer health-related QoL than patients in the ISCS group. One obvious reason for this difference was poorer visual acuity after first-eye surgery caused by the cataract in the fellow eye in the DSCS group. The remaining cataract in the fellow eye also caused significantly poorer binocular contrast sensitivity in the DSCS group. We could not find any difference in stereoscopic vision at any measurement. Anisometropia (2.0 D or more) in the DSCS group after 2 months was related to a higher total disability score sum compared with no anisometropia. The difference was not significant; however, this might have changed with a larger number of cases.

In this study, we chose a delay of 2 months between first-eye and second-eye surgery in the DSCS group. If the delay had been 1 week, the period of suboptimal quality of life would have been very short. In clinical practice, however, the delay may be much longer. If, because of cost issues, the delay between first-eye and second-eye surgeries will be long, ISCS should be considered, especially with an anticipated large anisometropia.

One limitation of the study is the small number of cases. However, most significant findings seemed stable

Table 3. CS and TNO test before surgery and 2 and 4 months after surgery.

Median	Before Surgery			After 2 Months			After 4 Months		
	ISCS	DSCS	<i>P</i> Value*	ISCS	DSCS	<i>P</i> Value*	ISCS	DSCS	<i>P</i> Value*
CS	1.65	1.65	.416	1.95	1.65	<.01	1.95	1.80	.070
TNO	120	120	.787	60	60	.772	60	60	.864

CS = contrast sensitivity; DSCS = delayed sequential cataract surgery; ISCS = immediate sequential cataract surgery; TNO = stereoscopic vision by TNO test
*Mann-Whitney *U* test

Table 4. Difference in refraction (spherical equivalent) between the eyes 2 and 4 months after surgery.

Parameter	After 2 Months			After 4 Months		
	ISCS	DSCS	<i>P</i> Value*	ISCS	DSCS	<i>P</i> Value*
Mean difference in refraction between the RE and LE (D)	0.57	1.66	<.01	0.53	0.57	.676

DSCS = delayed sequential cataract surgery; ISCS = immediate sequential cataract surgery
*Student *t* test

Table 5. Difficulties performing daily life activities (total disability score sum), satisfaction with vision, cataract symptoms, and vision-related difficulties in car driving as defined by the Catquest questionnaire before surgery and 2 and 4 months after surgery.

Parameter	Median Catquest Ranking Scores								
	Before Surgery			After 2 Months			After 4 Months		
	ISCS	DSCS	<i>P</i> Value*	ISCS	DSCS	<i>P</i> Value*	ISCS	DSCS	<i>P</i> Value*
Total disability score sum (range 7 to 34)	13.5	13.0	.966	8.0	11.0	<.001	7.0	7.0	.481
Satisfaction with vision (range 1 to 4)	3.0	3.0	.662	1.0	2.0	<.001	1.0	1.0	.441
Cataract symptoms (range 2 to 8)	4.0	4.0	.919	3.0	4.0	<.001	2.0	3.0	.179
Car driving (range 2 to 7)	3.0	3.0	.711	2.0	2.0	.053	2.0	2.0	.254

DSCS = delayed sequential cataract surgery; ISCS = immediate sequential cataract surgery
*Mann-Whitney *U* test

and there was no relationship close to being significant that could change with a larger number of subjects except the influence of anisometropia. Risks and complications related to ISCS cannot be evaluated in a small study such as this, and that was not the aim. However, several studies have been published arguing that ISCS does not lead to an increased incidence of intraoperative or postoperative complications.^{3,4,6} This is valid for both extracapsular cataract extraction^{14,15} and phacoemulsification.¹⁶

Patients in the DSCS group knew about their coming second-eye surgery and would probably have been dissatisfied as long as this promised surgery was not carried out. This may have exaggerated their self-assessed difficulties. However, all patients wanted second-eye surgery after the completed first-eye surgery. The patients were selected according to the inclusion criteria, and our conclusions are only valid for this type of cataract patient (ie, with no other eye diseases and no large ametropia).

From our study, it can be concluded that a patient in need of cataract surgery in both eyes benefits from having ISCS rather than DSCS in terms of time to restore visual

function. When both eyes of an individual are operated on, there is no difference in outcomes between the 2 surgical strategies. The economic implications will be discussed elsewhere.

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