ONE-DAY SIMULTANEOUS BILATERAL CATARACT SURGERY

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SUMMARY

Introduction: Effectiveness Evaluation of One-Day Simultaneous Bilateral Cataract Surgery (SBCS) Comparing to the Cataract Surgery Performed on Each Eye Separately After a Lapse of Time
Material and Methods: The cohort of 100 patients (200 eyes) consisted of two groups: In the Group1, there were 50 patients (100 eyes) who underwent One-day Simultaneous Bilateral Cataract Surgery (SBCS). The Group 2 consisted 50 patients (100 eyes) who had the surgery on one eye first, and later on the fellow eye. The course of the surgery, peroperative and postoperative complications were evaluated. The patients from the Group 1 were examined at the first postoperative day. In the next course, all patients were examined one week, one month, and 3 months after the surgery. In the postoperative phase were, besides the complications, the final visual acuity and refraction and its deviations from the target refraction followed up.
Results: Course of the surgery, peroperative and postoperative complications are comparable in both groups. Endophthalmitis, or other more serious postoperative complications did not appear in either group. Three months after the surgery, the uncorrected visual acuity (UCVA) 0.8 and better in the Group 1 had 75 % of patients, and in the Group 2 also 75 % of patients. The UCVA 0.5 and better in the Group 1 had 95 % of patients; in the Group 2 it had 90 % of patients. The best-corrected visual acuity 0.8 and better had in both groups 95 % of patients. The final refraction after 3 months in the Group 1 was –0.15 ± 0.91 (-0.12); -3.37; 2.00. In the Group 2 the final refraction after 3 months was –0.08 ± 0.91 (0.00); -3.25; 2.75.
Conclusion: The results are showing that both groups of our cohort are comparable. The One-Day Simultaneous Bilateral Cataract Surgery (SBCS) is, from the surgical point of view, equally safe and effective as classically performed cataract surgery.

Key words: One-Day Simultaneous Bilateral Cataract Surgery (SBCS), refraction, visual acuity, postoperative complications, intraocular pressure

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INTRODUCTION

The submitted study is intended to contribute to a discussion as to whether it is appropriate to perform cataract surgery routinely on both eyes simultaneously within the framework of one-day or outpatient surgery, and to define the criteria for this method of surgery. From the current view of cataract surgery, the chosen theme of the study is controversial, however its further development may become increasingly topical and change the routine established hitherto.

The Czech Ophthalmological Society (COS) currently does not recommend cataract surgery in both eyes on the same day (25). However, this method of surgery is not prohibited and is not considered a non lege artis procedure. Throughout the entire professional ophthalmological community, a narrowly delineated group of patients is recognised, for whom one-day simultaneous bilateral cataract surgery is indicated and performed. This concerns especially patients with poor mobility, patients with a social indication or those on whom it is necessary to operate under general anaesthesia, in which repeated narcosis in the given case presents a greater risk than the danger represented by any applicable risks of bilateral complications in the operated eyes.

The aim of the submitted study is to evaluate the efficacy and safety of one-day simultaneous bilateral cataract surgery in comparison with the results of operations performed with a time interval on each eye separately.

In the text the condition shall be referred to using the standard English abbreviation – ISBCS (immediate simultaneous bilateral cataract surgery).

METHOD

The study cohort comprised 100 patients (39 men, 61 women) with an average age of 73 years (SD ± 6.5, interval 53-89 years), who were operated on for cataract at the Department of Ophthalmology at the University Hospital in Ostrava in the period from 26 March 2012 to 4 July 2012. The patients were divided into two study groups. Group 1 (n = 50) comprised patients operated on for a cataract simultaneously in both eyes on one day, and group 2 (n = 50) comprised patients who were operated on for a cataract first of all in one eye and later with a time interval in the second eye. The fundamental demographic characteristics, preoperative values of intraocular pressure, axial length of eyes and the number of endothelial cells before surgery in the patients from both study groups is illustrated in summary (tables 1, 2, 3 and graph 1). From a comparison of the fundamental characteristics it is evident that the patients in both study groups did not differ significantly.

All patients coming for surgery within the given period were included in the cohort of both study groups, provided that they met the main conditions, i.e. they were operated on by a single surgeon and had the same type of intraocular lens implanted.

Group 1 included all the patients meeting the following cri-

teria:

1. Preferred surgery in both eyes on one day on own initiative, in the majority of cases patients had arrived with this request, or determined this option at our workplace and expressed a wish to have surgery on both eyes simultaneously,
2. Had a cataract in both eyes and met the conditions for indication for operation,
3. Did not have any of the following excluding factors:

a) Immunosuppressive/immunomodulation therapy,
b) More pronounced endothelial dystrophy (below 1300 endothelial cells per mm2)
c) Chronic uveitis with recurring attacks,
d) Posner-Schlossman syndrome
e) Pronounced form of pseudoexfoliation syndrome.

We also included patients with general pathologies in group 1 (diabetes mellitus, difficult to compensate arterial hypertension, psoriasis, chronic arthritis, thyroid gland disorder, bronchial asthma, pulmonary diseases etc.) or patients using Tamsulosin (tamsulosin hydrochloride) and drugs with similar effects (alpha-1 antagonists), as well as patients with a different ocular pathology (conditions following uveitis with posterior synechiae in the stage of remission, finding of epiretinal membrane, extreme axial length of eye), who are usually excluded by other authors as unsuitable and risk subjects. All of the above patients included in group 1 met the stated inclusion and exclusion criteria.

We intentionally do not mention the conditions stated in the other literature as an exclusion criterion, such as active blepharitis or other inflammatory disorders of the adnexa of the eye. We believe that a patient with an active inflammatory pathology in one eye (chalazion and others) not only cannot be operated on bilaterally, but may not be operated on even in the contralateral eye. The patient must always be first of all cured and only subsequently operated on. We did not encounter other conditions such as pterygium, conditions following previous refractive or filtering antiglaucomatous operations during the given period, and it was therefore not necessary to exclude these patients from the cohort.

Of the patients operated on bilaterally on one day, 3 patients were not included and evaluated in group 1. One male patient with bilateral severe form of age related macular degeneration (ARMD), one female patient with residual esotropia and severe amblyopia and one female patient with hemophthalmos in one eye who was in pars plana vitrectomy (PPV).

In the case of two patients with planned bilateral surgery, we came to the conclusion during the course of the operation on the first eye that it would be more advisable to defer surgery on the second eye and perform it at a later date. Large conjunctival suffusion developed in one of these patients during the course of the operation on the first eye. The patient was using anticoagulation therapy, and as a result there was a lar-

Tab. 1 Fundamental characteristics of patients of both study groups.

	Group 1, n1 = 50	Group 2, n2 = 50	p-value
Age	72.22 ± 6.80	74.04 ± 6.23	0.166*
	(71.50); 53; 89	(73.00); 58; 88	
Men	18 (36.0%)	21 (42.0%)	0.539**
Women	32 (64.0%)	29 (58.0%)	
Glaucoma	3 (6.0%)	5 (10.0%)	0.715***
Diabetes mellitus			0.805***
on diet	0 (0.0%)	1 (2.0%)	
on PAD	5 (10.0%)	7 (14.0%)	
on insulin	4 (8.0%)	3 (6.0%)	

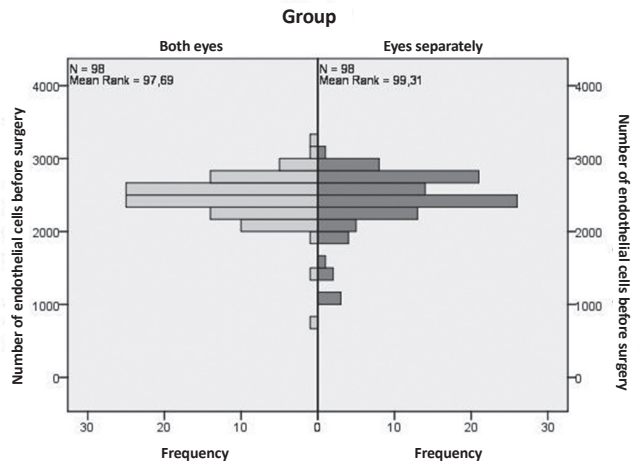
(n1 = number of patients in group 1, n2 = number of patients in group 2, * student t-test, ** X2 test, *** Fisher's exact test)

Tab. 2 Comparison of average preoperative values of intraocular pressure in both study groups. (* Mann-Whitney test).

	Group 1	Group 2	p-value
15.71 ± 3.74	15.99 ± 3.32	0.237*	0,237 *
(15.00); 9; 27	(16.00); 9; 22		

Tab. 3 Comparison of average length of eye in both study groups. (* Mann-Whitney test).

	Group 1	Group 2	p-value
Axial length of eye	23.16 ± 1.14	23.18 ± 1.11	0.901*
n1 = 100, n2 = 100	(23.11); 20.20; 28.15	(23.20); 21.01; 25.32	



Graph 1 Comparison of number of endothelial cells in both study groups

ge probability that the same complication could occur also in the second eye. In the other patient, the operation on the second eye was deferred due to the patient's very pronounced lack of co-operation. These patients, originally planned for ISBCS, were automatically included in group 2, and the results of surgery were evaluated here.

Group 2 included all patients operated on within the given observation period progressively, first in one eye and subsequently in the second (operated on by the same surgeon with implantation of the same intraocular lens).

Of the patients coming for surgery on each eye separately at a different date, we did not include in group 2 or subsequently evaluate five patients. In four cases this was due to inability or unwillingness to undergo planned checks at our centre, stated by the patients in advance. The last patient who was not included had bilateral severe form of ARMD with vision of 0.01 before surgery and 0.02 following surgery, and it was not possible to assess the result of the surgical procedure within the required scope.

All the patients in both study groups were operated on by a single surgeon in outpatient surgery, under local anaesthesia, only one female patient from group 1 was operated on under general anaesthesia with one-day hospitalisation due to an unforeseeable coughing attack. Within the framework of ensuring the homogeneity of the study cohort, only patients with senile and pre-senile cataracts were included in the study groups, other types of cataract (traumatic, congenital) were not included. A further condition was implantation of the same type of intraocular lens (IOL) – single-piece acrylate hydrophobic monofocal AcrySof SA60AT (Alcon Laboratories Inc., Fort Worth, TX, USA) in all eyes. Patients with a different type of IOL (multifocal, toric, other monofocal) were not included in the study cohort.

Postoperative emmetropia was planned for the majority of patients. However, upon their own request and following an agreement with the attending physician and surgeon, a small proportion of the patients were operated on with the aim of ensuring residual refraction so that the patients did not need to use correction by glasses for reading, whilst they were content to use glasses for distance vision. Objective refraction of the patients was measured on an automatic refractometer and converted to the spherical equivalent for the purposes of further statistical evaluation.

Before surgery, the local instillation anaesthetic Benoxi 0.4 drops (oxybuprocaine hydrochloride) were applied to the operated eye of all patients. In order to attain the required mydriasis, Unitropic 1% drops (tropicamide 1%) and Neosynephrine-POS 10% (phenylephrine hydrochloride) were applied. The patients operated on at our centre did not use preventive antibiotic drops before surgery. On the day of surgery, Oftaquix drops (levofloxacin 0.5%) were applied within the framework of preoperative preparation, within a regimen of 1 drop per 15 minutes, a total of four times. Phobic patients were administered 1 tablet of Lexaurin 1.5 mg (bromazepam). Disinfection of the eyelids and surrounding area of the eye was performed using diluted Betadine solution (10% povidone iodine), and rinsing of the conjunctival sac by 5% Betadine solution. The operating field was screened off using a single-use sterile screen and a cover fixed by a guard.

The surgical procedure was performed using a surgical microscope Lumera 700 (Carl Zeiss Meditec AG, Jena, Germany) and a phacoemulsification instrument Signature (Abbott Medical Optics Inc., Santa Ana, CA, USA), which enables the surgeon to work with both a peristaltic and a Venturi pump. All the patients in both groups were operated on in the mode of the peristaltic pump by means of a bimanual technique. Following the performance of 2 paracenteses, 1% lidocaine solution was applied intraocularly (0.1-0.2 ml), followed by the main incision with a width of 2.2-2.4 mm, most frequently in the meridian XII, or in the steepest meridian. Viscoelastic material was applied into the anterior chamber, service 2% methylcellulose was used on all patients. Continuous circular capsulorhexis (CCC) was performed by capsular forceps, followed by hydrodissection and hydro delamination in order to loosen the core, up to its free rotation. The technique of actual phacoemulsification was adapted to the type of cataract with the aim of achieving the maximum effectiveness. A chopper was used for fragmentation of the core, removal of the residual lens matter was performed by bimanual irrigation/aspiration. The designated intraocular lens was inserted into the cartridge with a small amount of viscoelastic material applied in advance, and subsequently implanted using a company introducer (Alcon). During implantation, the anterior chamber was not filled with viscoelastic material. The pressuring of the anterior chamber and the maintenance of its shape was achieved during implantation of the IOL by implementing an irrigation cannula by the left hand by paracentesis, and subsequently conducting irrigation. There then followed implantation of the intraocular lens by the right hand, the eye was simultaneously maintained in slight counterpressure against the introducer by means of the irrigation cannula. Implantation of the IOL by this method is easy and safe, furthermore lengthy irrigation of the viscoelastic material from the anterior chamber is not necessary, and there is no increase in intraocular pressure following surgery (upon metabolisation of the residual methylcellulose). Following the implantation of an intraocular lens and its placement in the lens sac, we applied 1 mg of cefuroxime (Axetine) into the an-

terior chamber. The operation was completed with hydration of the paracenteses and the surgical wound. Following removal of the screen, the eyelids and eyelashes were lightly wiped with 5% Betadine solution, and Oftaquix and Dexamethasone drops were applied into the conjunctival sac. The eye was covered with a sterile pad, affixed with a plaster. If only one eye was operated on, the operation was thus concluded.

In the case of bilateral cataract surgery, the patient was left in the operating theatre and all the further procedures were performed as if the patient had arrived for a new operation. The staff completely changed their clothing, the device was newly calibrated and new instruments were prepared. The second eye was again disinfected, prepared and screened as the first eye had been. The patient was taken from the operating theatre after the conclusion of the operation on the second eye. Patients who had both eyes operated on simultaneously on the same day did not have their eyes covered with a plaster, but wore dark glasses.

Subsequent postoperative checks were conducted on patients from group 1 on the first postoperative day. The patients from both groups then underwent further checks one week, one month and 3 months following surgery.

RESULTS

In the case of the majority of patients, this concerned surgery on an uncomplicated senile cataract, other associated findings were present in some of the patients, summarised in table 4. The most common secondary effect was endothelial dystrophy, which was more widely represented in group 2.

In one case, the course of the operation was complicated by a hole in the posterior capsule, with a subsequent small prolapsed of the vitreous body and a lateral spread of the defect. This concerned a patient with a senile cataract (male, 70 years, group 2), in whom a small posterior polar cataract was also present bilaterally. The hole in the posterior capsule originated through the detachment of the cataract from the capsule during hydrodissection. During irrigation/aspiration of the substance, the defect spread laterally, anterior vitrectomy was performed and the intraocular lens was the implanted into the capsule. Uncorrected visual acuity (UVA) in this patient was 0.9, best corrected visual acuity (BCVA) 1.0. In the other eye the course of the operation was without complications. We did not record any other more serious perioperative complications.

In a number of cases the course of the operation was more difficult due to the presence of IFIS (intraoperative floppy iris syndrome), as well as constricted pupil without IFIS, very shallow or conversely very deep anterior chamber of the eye, very hard core of the lens, lack of co-operation on the part of the patient, occurrence of large suffusion during the operation, synechiae with the necessity of their dislocation and other factors. The sum of these factors and complications is presented in summary in table 5. The most common finding which worsened the course of the operation in both groups was change of the depth of the anterior chamber and constricted pupil.

There was no statistically significant difference in the values of the implanted intraocular lenses in both groups (table 6).

Preoperative and postoperative refraction of the patients in both groups is summarised in table 7. The summary does not include all the patients due to the impossibility of measuring objective refraction in certain patients before surgery (pronounced cataract) and also after surgery (e.g. due to constricted pupil or insufficient co-operation on the part of the patient). The percentage distribution of final refraction in both groups is displayed in summary in graph 2. From graph 2 it ensues that 3 months after surgery, 61.7% of eyes in group 1 had final refraction within a range from -0.5 to +0.5 D, and in group 2 62.5% of eyes were within the same range. In the first group, 8.5% of eyes had refraction higher than -1 D, compared with 11% of eyes in group 2. 7.4% of eyes and 5.2% of eyes respectively had refraction higher than +1.0 D.

Subjective correction of residual refraction following surgery may differ from objectively measured refraction. The reason is the preferences of the patient or the consequence of an error of measurement by the auto-refractometer. We compared the resulting correction between the groups and their deviations from the required correction (table 8). As with refraction, we converted correction to spherical equivalent. The percentage distribution of the resulting correction in both groups is illustrated by graph 3. 9.4% of eyes in group 1 and 11.2% of eyes in group 2 had a final correction

Tab. 4 Comparison of frequency of secondary findings in operated eyes in both study groups.
(* One patient with endothelial dystrophy had posterior synechiae following uveitis).

Secondary findings	Group 1	Group 2
	N (eyes/patients)	N (eyes/patients)
Endothelial dystrophy	5 (3)	12 (6)
PEX (pseudoexfoliation syndrome)	0	2 (1)
Scar on cornea following trauma	1 (1)	0
Stp. glaucoma attack	0	1 (1)
Posterior synechia	1 (1)	1 (1)
Strabismus	1 (1)	1 (1)
Stp. LPI (laser peripheral iridotomy)	1 (1)	0
Total	9 (6)*	17 (10)

Tab. 5 Factors worsening course of groups.
(*Senile cataract with polar turbidity, **one patient with extremely hard core and deep chamber).

Factors worsening course of OP	Group 1	Group 2
	N (eyes/patients)	N (eyes/patients)
IFIS, constricted pupil	3 (2)	3 (2)
Constricted pupil without IFIS (< 4 mm)	3 (2)	1 (1)
Shallow AC	8 (4)	4 (2)
Deep AC	4 (2)	4 (2)
Extremely hard core	1 (1)	3 (2)
Posterior synechia, synechiolysis	1 (1)	1 (1)
Hole in PC + prolapsed of vitreous body	0	1 (1)
Pronounced suffusion	1 (1)	0
Haemorrhage into AC	0	0
Non-implanted IOL	0	0
Rupture of CCC	0	0
Zonulysis	0	0
Pronounced lack of co-operation	1 (1)	0
Total	22 (13)**	17 (11)

Tab. 6 Values of implanted intraocular lenses in dioptres (dpt.)
(*Mann-Whitney test).

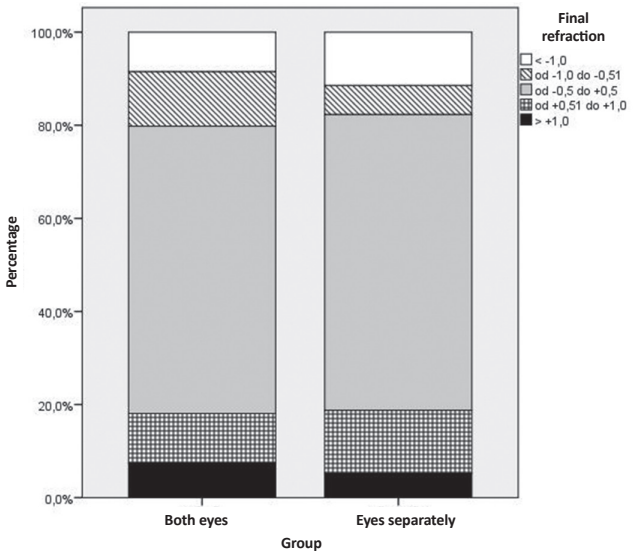
	Group 1	Group 2	p-value
Lens dpt.	22.24 ± 3.12	22.35 ± 3.07	0.896*
	(22.00); 11; 30	(22.50); 17; 30	

higher than -1.0 D. This concerned patients for whom there was an endeavour to attain postoperative close-up vision without correction by glasses. 8.3% of eyes and 4.5% of eyes respectively had correction from -1.0 D to -0.51 D, 81.3% and 83.1% of eyes respectively had correction from -0.5 to +0.5 D and 1% and 1.1% of eyes respectively had correction from +0.51 to +1.0 D. None of the operated eyes had correction higher than +1.0 D.

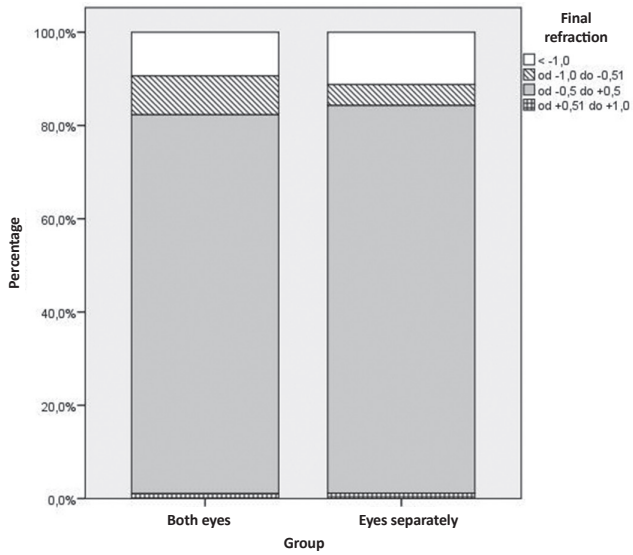
The values of uncorrected visual acuity (UVA) before surgery and 3 months after surgery are summarised in table 9. Patients in both groups had improved UVA following cataract surgery. The difference between the resulting values of UVA in the patients from both groups was not statistically significant – the improvement was on the same level in both groups.

A comparison of best corrected visual acuity (BCVA) between both groups before surgery and 3 months after surgery is summarised in table 10. BCVA was determined with the best subjective correction. BCVA improved after surgery in comparison with preoperative BCVA in both groups. There is no statistically significant difference in the values of postoperative BCVA between both groups.

The most common postoperative complication in the patients in both study groups was a finding of mild striata and viscomaterial on the corneal endothelium. In five cases this concerned more pronounced striata on the first day after surgery in patients from group 1. UVA in these patients was from 0.2 to 0.3 on the first postoperative day. Striata subsided without consequences within a few days. An overview of the most common postoperative complications is presented in summary in table 11.



Graph 2 Percentage expression of final refraction in both groups of operated eyes



Graph 3 Percentage expression of final correction in both groups of operated eyes

Increase in intraocular pressure (IOP) above 23 torrs after surgery was rather isolated, we recorded such increased IOP only in five eyes on the first day after surgery in group 1. The increase in intraocular pressure was not at all dramatic, and responded very well to short-term administered local antiglaucomatous therapy. The values of intraocular pressure in patients in both groups before surgery and during postoperative checks are presented in table 12. There was no statistically significant difference in IOP values between both groups within the observed period. At the same time, however, a statistically significant reduction in IOP was recorded in both groups in comparison with the preoperative values ($p < 0.0005$, Friedman test).

In the postoperative period we focused especially on observing the incidence of infectious postoperative complications. We did not record any occurrence of endophthalmitis or any more pronounced non-infectious inflammatory reaction in any of the operated patients, only in one patient from group 1 a finding of fine fibrin fibres in the pupil of the right eye appeared at a follow-up examination after one week, in which the finding was within the norm and without complications on the first postoperative day. Following more intensive local therapy using corticosteroids (Dexamethasone drops every 2 hours) the finding subsided within two days.

In another patient from group 1 we recorded a small residue of lens matter in the anterior chamber of the left eye at a follow-up examination after one week. The eye was calm, without irritation, UVA was 1.0. The finding subsided within two weeks, without the necessity of surgical intervention.

Further complications recorded in the longer postoperative course are summarised in table 13. Cystoid macular edema (CME) developed in four eyes of three different patients. In all the patients, CME subsided after conservative therapy.

Tab. 7 Comparison of objective refraction before and after surgery in both study groups.
(n1 = number of eyes in group 1, n2 = number of eyes in group 2, *Mann-Whitney test).

Refraction	Group 1	Group 2	p-value
Before surgery	1.05 ± 2.95	0.70 ± 3.00	0.605*
n1 = 94, n2 = 91	(1.25); -11.62; 6.87	(1.25); -9.62; 6.25	
3 months after surgery	-0.15 ± 0.91	-0.08 ± 0.91	0.207*
n1 = 94, n2 = 96	(-0.12); -3.37; 2.00	(0.00); -3.25; 2.75	

Tab. 8 Comparison of resulting correction between both groups and deviations from required correction.
(*Mann-Whitney test).

Correction	Group 1	Group 2	p-value
Before surgery	0.60 ± 2.96	0.315 ± 2.71	0.440*
n1 = 82, n2 = 83	(1.00); -10.0; 6.5	(1.00); -8.5; 6.5	
3 months after surgery	-0.41 ± 0.79	-0.34 ± 0.70	0.416*
n1 = 96, n2 = 89	(0.00); -3.5; 0.75	(0.00); -3.12; 0.75	

Tab. 9 Comparison of uncorrected visual acuity – UVA before surgery and 3 months after surgery in both study groups.
(*Mann-Whitney test).

UVA	Group 1	Group 2	p-value
Before surgery	0.371 ± 0.212	0.379 ± 0.189	0.646*
n1 = 89, n2 = 86	(0.330); 0.01; 0.80	(0.330); 0.03; 0.80	
3 months after surgery	0.862 ± 0.175	0.864 ± 0.187	0.747*
n1 = 87, n2 = 85	(0.900); 0.33; 1.00	(0.900); 0.33; 1.00	

Tab. 10 Comparison of best corrected visual acuity – BCVA before surgery and 3 months after surgery in both study groups.
(*Mann-Whitney test).

BCVA	Group 1	Group 2	p-value
Before surgery	0.639 ± 0.190	0.622 ± 0.171	0.260*
n1 = 97, n2 = 94	(0.660); 0.16; 0.80	(0.660); 0.16; 0.80	
3 months after surgery	0.965 ± 0.102	0.965 ± 0.083	0.559*
n1 = 95, n2 = 93	(1.000); 0.33; 1.00	(1.000); 0.50; 1.00	

Tab. 11 Most common postoperative complications.
(*Striata worsening vision, **resulting best corrected visual acuity – BCVA 1.0, ***individual values of intraocular pressure – IOP 24, 24, 24, 26 and 27 torrs).

Postoperative complication	Group 1	Group 1	Group 2	Group 1+2	Group 1+2
	1st day	week	week	month	3 months
	N eyes/patients	N eyes/patients	N eyes/patients	N eyes/patients	N eyes/patients
Pronounced striata*	5 (4)**	0	0	0	0
Mild striata	8 (5)	3 (2)	7 (6)	0	0
Viscomaterial on endothelium	14 (9)	1 (1)	6 (5)	0	0
Increase of IOP above 23	5 (5)***	0	0	0	0

Tab. 12 SComparison of average postoperative values of intraocular pressure in both study groups.
(n1 = number of eyes in group 1, n2 = number of eyes in group 2, *Mann-Whitney test).

IOP	Group 1	Group 2	p-value
Before surgery	15.71 ± 3.74	15.99 ± 3.32	0.237*
n1 = 100, n2 = 100	(15,00); 9; 27 (15.00); 9.27	(16,00); 9; 22 (16.00); 9; 22	
1st day after surgery	15.68 ± 4.39	Not examined	Not evaluated
n1 = 98, n2 = 0	(16.00); 8; 27		
1 week after surgery	12.81 ± 3.13	13.28 ± 3.59	0.315*
n1 = 100, n2 = 100	13,58 ± 3,44 (13.00); 8; 22	13,62 ± 3,48 (13.00); 7; 21	0,692 *
1 month after surgery	13.58 ± 3.44	13.62 ± 3.48	0.692*
n1 = 100 n2 = 100	(13,00); 8; 21 (13.50); 7; 23	(13,00); 8; 19 (14.00); 1; 22	
3 months after surgery	12.96 ± 2.77	12.98 ± 2.60	0.745*
n1 = 98 n2 = 99	(13.00); 8; 21	(13.00); 8; 19	

Mild fibrotic reaction in the anterior chamber and residue of the lens matter were also absorbed following local therapy. There were no serious postoperative complications.

DISCUSSION

The theme of immediate simultaneous bilateral cataract surgery is controversial but topical. In the last decade, a range of studies dealing with this issue have appeared in foreign publications (3, 10, 12, 13, 15, 17, 19, 23, 26, 29, 40). In the Czech professional literature there is only one publication focusing on immediate simultaneous bilateral cataract surgery (30). This is a study by the authors Mašek and Janula from 1982, in which they describe the results of immediate simultaneous bilateral cataract surgery at the Department of Ophthalmology in Brno, which at the time was still performed by means of intracapsular cryoextraction.

Our study is the first in the Czech Republic to focus on ISBCS in the era of phacoemulsification. Its results are comparable with the results of studies conducted by foreign authors (2, 18, 20, 41, 43).

More serious perioperative complications did not occur in group 1. Of the less serious perioperative complications, pronounced subconjunctive suffusion occurred in one patient who had originally been planned for bilateral surgery, which resulted in the deferral of the operation on the second eye and the patient's exclusion from group 1. This concerned a patient who was using anticoagulation therapy, in whom there was an expectation that this could lead to the same complication also in the second eye. Use of anticoagulants is not a contraindication for cataract surgery, and at present its preoperative discontinuation is not required. Surgery is performed by means of an incision in the clear cornea, and in the case that there is no further complicating condition such as posterior synechia, we commonly operate on patients with anticoagulation therapy without special preparation. With regard to the fact that suffusion may be a

Tab. 13 Other postoperative complications and their frequency.

Postoperative complications (other)	Group 1	Group 2
	Eyes (patients)	Eyes (patients)
CME (cystoid macular edema)	2 (1)	2 (2)
Fibrin reaction (mild)	1	0
Residual lens matter	1	0
Trichiatic eyelashes	0	1
Bullous keratopathy	0	0
Endophthalmitis	0	0

breeding ground for the growth of pathogens, we decided in this case to defer surgery on the second eye until the period following the healing of the first eye. In the professional literature we have not encountered this complication, stated as the reason for deferral of the operation on the second eye. A further cause of deferral of surgery on the second eye and exclusion of a patient from group 1 was pronounced lack of co-operation during surgery on the first eye. Such a complication of the course of planned ISBSC is described for example by Arshinoff (4).

In group 2 a rupture of the posterior capsule appeared during the operation in one patient. This was a patient with a senile cataract (male, 70 years), who also had a polar cataract. During hydrodissection the polar turbidity was severed in such a manner that a defect occurred in the posterior capsule of the lens. Phacoemulsification of the core of the lens took place without complications, in the phase of irrigation/aspiration of the lens matter, however, the defect of the posterior capsule spread laterally with a subsequent minor leakage of the vitreous body. Anterior vitrectomy was performed, evaginating the vitreous body, the defect was not large and it was possible to perform implantation of the intraocular lens into the capsule. Resulting UVA was 0.9, BCVA 1.0 with small additional correction. We did not record any other perioperative surgical complications.

We do not consider primarily non-standard conditions such as IFIS, constricted pupil, hard core, posterior synechia, extremely deep or shallow chamber to represent complications, but rather conditions which complicate, i.e. are more difficult to operate on. The incidence of these complicating factors was comparable in both groups (see table 5). If the patient has a constricted pupil, at our centre we have the option of using a Malyugin ring. However, we only use this in isolated cases. In the cohort of patients in this study we operated on all cases of constricted pupil without the use of mechanical dilation.

An important component of performance of cataract surgery by the method of ISBCS is the creation of the centre's own protocol for deciding on whether to perform surgery on the second eye, or to defer this. It is necessary to abide by this protocol. However, this does not mean that it is fixed. A certain role is played by its development over time. Initially it should be as strict as possible, but after a certain period it could be modified. Not every complication is so serious that it would rule out the possibility of performing surgery on the second eye. On the other hand, it is not always appropriate to perform surgery on the second eye, even if the course on the first eye was without surgical complications. The experience of the operating surgeon is of fundamental importance, and the surgeon's intuition may prevent complications in the second eye. The patient's own personality and current state of mind are also important for the final decision. As a result we consider a brief interview between the operating surgeon and the patient before the operation to be an important component of the entire procedure. We inform the patient about the course of the operation and at the same time determine his/her expectations.

Increase in intraocular pressure following surgery is mostly transitory, on the first postoperative day. The dependency of the increase in intraocular pressure on the used viscoelastic material during standard surgery was demonstrated by Skorkovská et al. (45). At the same time, within their study cohort the greatest increase in IOP occurred on the first postoperative day, regardless of the viscoelastic material used. Intraocular pressure was normalised within a week of surgery. Beatty et al. in their study cohort (8) had 19 eyes (3%) of 17 patients with increased intraocular pressure following ISBCS. However, this concerned extracapsular cataract extraction (ECCE). Ramsey et al. (38) state a similar percentage (2.9%), in their study patients had undergone both ECCE and phacoemuslfication. Sarikkola et al. (42) compared two groups, the first was operated on using the ISBCS method, the second was a control group operated on by the classic method. The incidence of higher intraocular pressure was comparable in both groups on the first postoperative day (6.1% and 7.3%). In our cohort, in group 1 we recorded increased intraocular pressure on the first day after surgery in 5 eyes of 5 patients (5%). Only in 2 cases (2%) was IOP higher than 25 torrs (26 and 27 torrs). We did not record an increase of more than 30 torrs. One week after surgery the intraocular pressures of all patients were within the norm. In both group 1 and group 2 we recorded a statistically significant decrease in intraocular pressure 3 months after surgery (Friedman test $p = 0.0005$). Upon a comparison of the values of IOP between group 1 and group 2, however, no statistically significant difference was demonstrated (Mann-Whitney test, $p = 0.745$), the results were the same in both groups.

In the postoperative period we recorded more pronounced striata of the cornea in 4 patients (5 eyes) on the first postoperative day, which subsided without consequences within a week after the operation. At follow-up examinations after one month and three months we did not record any decompensation of the endothelium or development of bullous

keratopathy. Arshinoff (2) presents one case of severe endothelial decompensation following ISBCS in one eye, which subsequently had to be resolved by means of perforating keratoplasty. Bilateral decompensation of corneal endothelium following ISBCS is described by Taygi and McDonnell (47).

The resulting postoperative refraction and its deviations from the required value are an important component in the evaluation of the results of cataract surgery. Sarrikola (41) states best corrected visual acuity of 0.5 and better in 84% of patients following ISBCS, and 66% with visual acuity of 0.8 and better. In their study, postoperative refraction was ± 0.75 dioptres from the required value in 78% of cases, and ± 1.5 dioptres in 95%. Murphy (34) evaluated the results of postoperative refraction on a group of 1676 eyes operated on by the standard method. There was a difference of up to ± 1 D from the required refraction in 72.3% of eyes and from ± 1 D to ± 2 D in 96.6%. UVA was 0.5 and better in 56.3% of patients, BCVA was 0.5 and better in 86.9% of patients. After the exclusion of preoperative comorbidities, the results were UVA of 0.5 and better in 65.1% of eyes and BCVA of 0.5 and better in 95.4%.

In our cohort of patients, we had postoperative refraction of up to ± 1 D in 84.1% of eyes in group 1, and 83.8% of eyes in group 2. We also evaluated the subjective correction with which the patients attained best corrected visual acuity following the operation. This subjective correction may differ from objectively measured refraction due to the imprecision of measurement on an auto refractometer, and is a better indicator of the resulting condition. After surgery, patients obtain the subjectively determined correction with which they attain best visual acuity. This subjective correction best accommodates their everyday activities in normal life. In group 1 the resulting correction was ± 0.5 D in 81.3% of eyes, in group 2 in 83.1% of eyes. Correction of up to ± 1 D was in 90.6% and 88.8% of eyes respectively. There was no statistically significant difference between groups 1 and 2 in final refraction or correction (see tables 7 and 8).

Resulting postoperative UVA in group 1 was 0.862 ± 0.175 (0.900); 0.33; 1.00. In group 2 UVA was 0.864 ± 0.187 (0.900); 0.33; 1.00. BCVA in group 1 was 0.965 ± 0.102 (1.000); 0.33; 1.00 and in group 2 0.965 ± 0.083 (1.000); 0.50; 1.00. There was no statistically significant difference between the groups (Mann-Whitney test). The results of postoperative refraction, correction and resulting visual acuity are in accordance with studies conducted by other authors (34, 41).

Cystoid macular edema following cataract surgery may worsen resulting visual acuity, especially if it progresses to the chronic stage. Sarrikola (42) states affliction of one eye by CME in the group of ISBCS, and of two eyes in a single patient in the control group. Arshinoff (2) observed transitory CME in 6 eyes (5 patients) in his group of ISBCS operations. CME was reabsorbed in all cases within 6 weeks following topical application of 1% prednisolone acetate four times per day. Sharma (44) states transitory CME in 2 eyes out of a total of 288 operated eyes (ISBCS). CME subsequently subsided, and resulting visual acuity was 0.5 and 0.8. We observed transitory incidence of CME in 4 eyes (3 patients). In all the affected eyes, the development of CME occurred between the postoperative follow-up examinations conducted after one week and after one month. One week after surgery, all the affected eyes had BCVA of 1.0. The first to be afflicted was a female patient from group 1, in whom CME had developed in both eyes. One month after surgery, vision had deteriorated in both eyes, in the right eye visual acuity was 0.5 and in the left eye 0.33. The patient subjectively perceived a deterioration of vision, more so in the left eye. In group 2 transitory CME occurred in two male patients. The first was afflicted in the left eye, visual acuity deteriorated from 1.0 to 0.5 one month after surgery, the patient subjectively perceived a deterioration of visual acuity. The second patient from group 2 had a very similar course, visual acuity deteriorated from 1.0 to 0.5, but in the right eye. The patient subjectively stated that vision in the right eye was not as good as in the left. Both patients with CME in group 2 had a prostate condition and were using Tamsuolsin, in the first of these patients IFIS had been recorded perioperatively. In all the affected eyes, CME was reabsorbed with adjustment of visual acuity upon topical therapy with Dexamethasone drops five times per day. At a follow-up examination 3 months after surgery, BCVA was 1.0 in all the affected eyes.

Of other postoperative complications we recorded a small residue of lens matter in the anterior chamber of the right eye in one patient from group 1 at a follow-up examination one week after surgery. The residues of the lens matter may be a potential risk for the occurrence of endophthalmitis (27). In our patient, UVA was 0.9, the eye was calm, without any other signs of irritation, as a result of which conservative, only local therapy was applied. One month after surgery the remainder of the matter had been absorbed, UVA was 1.0. The eye was calm also at the follow-up examination after 3 months, visual acuity remained at 1.0.

Of the non-serious to medium-serious postoperative complications following cataract surgery, flare in the anterior chamber, postoperative iritis, uveitis, fibrin in the anterior chamber and TASS have been described (2, 11, 28, 38, 42, 44, 48). In our study cohort we recorded only one case of incidence of fine fibrin fibres in the pupil one week after surgery, in a female patient in group 1. On the first day after surgery the finding in both eyes was calm. One week after surgery, fibrin occurred in the pupil of the right eye. UVA of the affected eye was 1.0. The condition was resolved by adjusting local therapy, one month after surgery the finding was without fibrin in the anterior chamber, the eye was calm, UVA 1.0.

A serious complication is represented by postoperative endophthalmitis. The incidence of postoperative endophthalmitis before the introduction of phacoemulsification was 0.086% - 0.71% (1, 16), in some cases also 3-6% (36). With a change in the operating technique and the introduction of intracamerally administered antibiotics, there was a reduction in the incidence of postoperative endophthalmitis to 0.028%-0.042% (14, 32, 46).

The possibility of the occurrence of bilateral postoperative endophthalmitis following ISBCS is the main and unshakeable argument against the performance of simultaneous bilateral cataract surgery. In the literature we found 4 hitherto published cases of bilateral endophthalmitis following ISBCS (9, 22, 35, 37). BenEzra and Chirambo (9) present a case from 1978. Dysentery with

general bacteremia developed in the patient 24 hours after bilateral cataract surgery. Intravenous administration of mega-doses of penicillin and peroral administration of chloramphenicol led to an improvement of the patient's general condition. Although the ocular finding calmed, the resulting vision in both eyes was only hand movement in front of the eye. In 2005, Özdek et al. (35) refer to a patient, a seventy year old man who underwent ISBCS under general anaesthesia at another workplace. On the second postoperative day vision was movement in front of the eye bilaterally. The patient was treated with locally, intravitreally and generally administered antibiotics, the resulting vision in the right eye was 0.4, in the left eye 0.5. Kashkouli et al. (22) describe a case of bilateral endophthalmitis in a sixty seven year old man. The surgeon did not change the instruments between the operation on the first and second eyes. On the second postoperative day, bilateral endophthalmitis developed, the patient was treated at the original workplace with locally, intravitreally and generally administered antibiotics. On the third postoperative day, the condition deteriorated further and the patient was sent to the workplace of the authors. Vision in the right eye was without light perception, in the left eye light perception with defective projection. Pars plana vitrectomy (PPV) was immediately performed on both eyes, with explantation of the IOL. The cultivation was demonstrated to be the developing pathogen Pseudomonas aeruginosa. The patient was without light perception bilaterally one week after surgery. The last published case of bilateral endophthalmitis is an article by Puvanachandra et al. (37) from 2008. The patient was an eighty one year old woman. Surgery was performed on both eyes without complications. On the fourth postoperative day, there was a sudden deterioration of vision in both eyes, in the right eye movement in front of the eye, in the left eye 0.25. Intensive ATB therapy was commenced locally, intravitreally and generally. The cultivation from the vitreous body demonstrated Staphylococcus epidermidis sensitive to gentamicin, ciprofloxacin and vancomycin. The resulting postoperative visual acuity was 0.67 bilaterally 2 months after surgery. Of these 4 published cases of bilateral endophthalmitis following ISBCS, there was an undesirable result in the case of the patient with general bacteremia (9) and in the patient who was operated on bilaterally using the same set of instruments (22). In the other two patients, relatively good resulting vision was attained (35, 37). We have more information about the incidence of unilateral postoperative endophthalmitis in the case of patients operated on simultaneously in both eyes (5, 8, 18, 21, 24, 38). From the published works, it ensues that the incidence of postoperative endophthalmitis in one eye upon ISBCS is entirely comparable with the incidence of endophthalmitis in patients operated on using the standard procedure.

According to the last study by the ESCRS (European Society of Cataract and Refractive Surgeons) from 2013, the incidence of endophthalmitis is 0.049% - 0.34% (7), depending on the use of antibiotics. The best results were in the group with application of cefuroxime intracamerally. Other authors (6, 39) also state a beneficial effect of intracamerally administered cefuroxime or other antibiotics on the incidence of postoperative endophthalmitis. Cefuroxime acts especially on gram positive bacteria, with the exception of MRSA (methicilin resistant Staphylococcus epidermidis) and Enterococcus facealis (7). However, the actual administration of cefuroxime into the anterior chamber of the eye at the end of the operation is also not entirely without risks. Moisseiev and Levinger (33) described an anaphylactic reaction following the application of cefuroxime. This concerned a 64 year old woman who had undergone uncomplicated cataract surgery. In the anamnesis she had an allergy to penicillin, but not to cefuroxime. She had also never had an anaphylactic reaction to any drug. 5 minutes after surgery she began to experience complaints, first of all allergic manifestations, which became more pronounced, culminating in an anaphylactic reaction. The situation was managed by administering drugs, including a bolus of 125 mg methylprednisolone intravenously, and the patient was transferred to the urgent medicine department. She was discharged a few hours later, resulting visual acuity in the operated eye was 1.0.

In our study we did not record any incidence of endophthalmitis or other serious infectious postoperative complications.

CONCLUSION

On the basis of our experiences with the performance of immediate simultaneous bilateral cataract surgery, we indicate the performance of ISBCS on the following preconditions:

a) A cataract suitable for surgery is present in both eyes,
b) The patient prefers ISBCS to classically performed surgery,
c) The patient does not have a local or general finding excluding the performance of ISBCS (immunosuppressive or immunomodulation therapy, pronounced endothelial dystrophy, chronic uveitis with recurring attacks, Posner-Schlossman syndrome, pronounced form of PEX), and at the same time meets points a) and b),
d) The centre has corresponding facilities for the performance of such types of surgery.

From a surgical perspective, immediate simultaneous bilateral cataract surgery (ISBCS) is equally as safe and effective as classically performed cataract surgery.

We consider the advantages of immediate simultaneous bilateral cataract surgery to include the comfort of the patient, who undergoes a subjectively stressful experience only once. The system of postoperative follow-up examinations is made simpler for the patient, who can return to regular life early. From a society-wide perspective, it is also possible to view reduction of expenditures on healthcare in the segment of cataract surgery as an advantage. An essential condition for the performance of ISBCS is corresponding technical and personnel equipment of the workplace. For the healthcare facility and the surgeon an advantage is the better logistics of the course of the entire procedure, and better utilisation of the labour force. Economy of operation is more efficient.

A disadvantage of ISBCS is the danger of bilateral postoperative complications, especially bilateral endophthalmitis. From this perspective, we do not yet consider ISBCS to be the method of first choice in cataract surgery at the present time. Nevertheless, it has its place within cataract surgery, and represents one of the options for performance of surgery. In future we envisage a more pronounced spread of the use of this method.

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