



Simultaneous Bilateral Phacoemulsification and Intraocular Lens Implantation

Simultane Bilateral Fakoemulsifikasyon ve Göz İçi Lens İmplantasyonu

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Summary

Purpose: To assess the visual outcomes, benefits, and drawbacks of simultaneous same-day phacoemulsification and intraocular lens (IOL) implantation in patients having bilateral cataracts.

Material and Method: The medical records of 346 patients (692 eyes) with bilateral cataracts who have undergone simultaneous bilateral cataract extraction (SBCE) with phacoemulsification and IOL implantation performed by a single surgeon (LA), were reviewed retrospectively. Outcome measures were intraoperative and postoperative complications, best-corrected postoperative visual acuity (BCVA), refractive errors, and patient satisfaction.

Results: BCVA increased in 633 (91.5%) eyes, decreased in 12 (1.73%) eyes, and remained the same in 47 (6.8%) eyes. The incidence of intraoperative complications was 7.2% (n=50). These complications included posterior capsule rupture with vitreous loss in 20 eyes (2.8%) and without vitreous loss in 17 eyes (2.4%), zonular dehiscence in 9 eyes (1.3%), IOL haptic fracture in 2 eyes (0.28%), iridodialysis in 1 eye (0.14%), and nuclear drop in 1 eye (0.14%). Late postoperative complications occurred in 31 eyes (4.5%).

Discussion: With a careful preoperative evaluation performed by an experienced surgeon under strict surgical protocol, simultaneous bilateral phacoemulsification and IOL implantation may be a beneficial procedure. surgical success rate. (*Turk J Ophthalmol* 2013; 43: 149-55)

Key Words: Bilateral cataract surgery, simultaneous cataract surgery, phacoemulsification

Özet

Amaç: Bilateral kataraktı olan hastalarda aynı günde uygulanan simultane fakoemulsifikasyon ve göz içi lens (GİL) implantasyonunun görsel sonuçlarını, faydalarını ve zorluklarını araştırmak.

Gereç ve Yöntem: Bilateral kataraktı olup aynı cerrah (LA) tarafından simultane bilateral katarakt ekstraksiyonu (SBKE) ve GİL implantasyonu yapılan 346 hastanın 692 gözü retrospektif olarak değerlendirildi. Ameliyat sırasındaki ve sonrasındaki komplikasyonlar, en iyi düzeltilmiş postoperatif görme keskinlikleri, refraksiyon kusurları ve hasta memnuniyeti değerlendirildi.

Sonuçlar: En iyi düzeltilmiş görme keskinliği (EDGK) 633 (%91,5) gözde arttı, 12 (%1,73) gözde azaldı ve 47 gözde (%6,8) aynı kaldı. Ameliyat sırasında görülen komplikasyon oranı %7,2 (n=50) idi. Bu komplikasyonlar; 20 (%2,8) gözde vitreus kaybı ile birlikte arka kapsül yırtığı; 17 (%2,4) gözde vitre kaybı olmaksızın arka kapsül yırtığı; 9 gözde (%1,3) zonüler diyaliz; 2 gözde (%0,28) GİL haptik fraktürü; 1 gözde (%0,14) iridodializ ve 1 gözde (%0,14) nükleus drop görüldü. Geç komplikasyonlar 31 gözde (%4,5) görüldü.

Tartışma: Deneyimli bir cerrah tarafından ameliyat öncesinde yapılan dikkatli bir değerlendirme ile birlikte titiz bir cerrahi protokol altında, bilateral fakoemulsifikasyon ve GİL implantasyonu yararlı bir uygulama olabilir. (*Turk J Ophthalmol* 2013; 43: 149-55)

Anahtar Kelimeler: Bilateral katarakt cerrahisi, simultane katarakt cerrahisi, fakoemulsifikasyon

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Introduction

Cataract surgery is the most commonly performed elective surgical procedure in elderly people. Since phacoemulsification became the standard method, the surgery time and the complication rates have decreased, while the results have improved. The approved standard for eye surgery is to operate on one eye at a time; however, the majority of cataract patients have cataracts that need surgery in both eyes. It is known that bilateral cataract surgery can be performed in both eyes during a single surgical session in children and in patients who cooperate poorly so that patients are not at risk from side effects of the second dose of general anesthesia and can achieve earlier visual binocular rehabilitation. Bilateral simultaneous cataract surgery is also preferred in accommodative intraocular lens (IOL) implantation.¹

The benefits of simultaneous bilateral cataract surgery include fewer medical visits as well as faster recovery of binocular vision and more rapid return to normal living.² The risk of bilateral endophthalmitis is the most feared complication that prevents surgeons from performing bilateral cataract surgery.³ The incidence of postoperative endophthalmitis is 0.1% and usually occurs within 48 hours of the procedure.⁴ However, if each eye is treated as an entirely separate operation, the risk of endophthalmitis occurring bilaterally is the same as if the operations were carried out during different sessions.

Here, we report the outcomes of 346 cases (692 eyes) of planned simultaneous bilateral phacoemulsification and IOL implantation performed by a single surgeon, retrospectively.

Material and Method

The medical records of 346 elderly patients with bilateral cataracts who have undergone simultaneous bilateral phacoemulsification in Dr. Lutfi Kirdar Kartal Training and Research Hospital between September 2003 and September 2009 were reviewed retrospectively. Since this study was a retrospective analysis of the medical records, ethical approval was not obtained.

The standard procedure included two separate phacoemulsification surgeries with a clear corneal incision and implantation of a foldable silicone or hydrophobic acrylic lens in the capsular bag without using a suture. All patients were operated on by the same surgeon (LA).

The anesthesia used most frequently included subtenon anesthesia, which was used on 373 (53.9%) of the eyes followed by intracameral anesthesia in 158 eyes (22.8%), topical anesthesia in 137 eyes (19.8%), general anesthesia in 16 (2.3%) eyes, and retrobulbar anesthesia in 8 eyes (1.15%). Retrobulbar anesthesia was used in 4 eyes of 2 patients, one of whom had asthma as a contraindication for general anesthesia, while the other suffered from deafness. General anesthesia was used in 8 patients (16 eyes) of whom 1 was mentally retarded, 1 had schizophrenia, 2 demanded general anesthesia themselves due to operation anxiety, and 4 were suffering from dementia.

Parameters studied included preoperative and postoperative visual acuity measured by the Snellen chart, preoperatively recorded concurrent eye disease or general health problems, preoperative and postoperative complications, and satisfaction of the patient.

Patients who were thought to be suitable for bilateral surgery or who expressed an interest in bilateral surgery were informed about the bilateral surgery as well as the risks and the benefits involved. If the patient was eligible and consented, the second operation was planned immediately after the first one and the patient remained in the operating theatre while all equipment was changed for the second procedure. If not contraindicated, 5 mg intramuscular diazepam was given 1 hour preoperatively. The routine for infection prophylaxis included exact and careful rinsing of the conjunctival sac of each eye with povidone iodine (Betadine 5%) for at least 3 minutes. No antibiotics were added to the irrigation fluid and no topical antibiotics were applied preoperatively. The eye with the lower visual acuity was operated on first. After successful completion of surgery of the first eye, the gloves, drapes and gowns were changed and a new set of instruments and irrigation solution were used.

Patients and surgeons had the possibility to change their mind and decline the second operation after the first was completed. If any sight threatening complication such as nuclear drop, zonular dehiscence greater than 120 degrees or expulsive hemorrhage occurred in the first eye, the operation of the second eye was cancelled and these patients were not included in the study. All cases received the intracameral antibiotic cefuroxime as prophylaxis against infection. Topical moxifloxacin (0.5%) was used for 2 weeks and prednisolone acetate for 2 or 3 weeks postoperatively.

The only inclusion criteria for the patients in this study were patients with bilateral senile cataracts who were considered suitable for or who expressed an interest in bilateral surgery. The exclusion criteria were patients with chronic uveitis, previous refractive corneal surgery, very short or long axial lengths or extreme or irregular corneal curvatures, uninterested or uncertain patients, patients with proliferative diabetic retinopathy, uncontrolled hypertension or glaucoma, patients with any complication that occurred during the first operation, and children with congenital cataracts.

Results

One hundred sixty-nine cases (48.8%) were male and 177 cases (51.2%) were female. The mean age was 73.16 years (females 70.83, males 75.49 years) and 284 (82%) were aged 65 or older. The mean follow-up period was 44.27 (between 9 and 76) months.

Preexisting ocular comorbidity in addition to cataract was recorded in 266 eyes (38.4%) These are listed in Table 1.

Preoperatively, 440 (63.5%) eyes had best-corrected visual acuity (BCVA) of 20/100 or less. Of the 440 eyes with BCVA of 20/100 or less, 122 eyes (out of 692) (17.6%) were able to count fingers from 1 to 3 meters away, 36 (5.2%) were able to detect hand motion, and 20 (2.8%) eyes were positive for the perception of light. A BCVA between 20/200 and 20/100 was seen in 262 (37.8%) eyes, and a BCVA between 20/66 and 20/40 was seen in 218 of 692 eyes (31.5). A BCVA of 20/33 and over was seen in 34 eyes (4.9%).

Three months after the operation, the BCVA was 20/100 or less in 83 (11.9%) eyes. The lowest vision determined was hand motion (6 eyes) (0.86%). In 140 eyes (20.2%), BCVA was between 20/66 and 20/40, and in 469 eyes (67.8%), it was 20/33 and over. Of the 469 eyes with a BCVA of 20/33 and over, 122 (17.6%) could read the Snellen chart at 20/20, 138 (19.9%) could read 20/22, 108 (15.6%) could read 20/25, 31 (4.5%) could read 20/28.5, and 70 (10.1%) could read 20/33.

The preoperative and postoperative BCVA values are shown in Figure 1.

The final BCVA increased in 633 (91.5%) eyes, decreased in 12 (1.73%) eyes, and in 47 (6.8%) eyes, it remained the same. The features of the patients with decreased visual acuity after the surgery are described in Table 2.

The incidence of intraoperative complications was 7.22% (n=50). The intraoperative complications are summarized in Table 3. Anterior vitrectomy was performed in all cases with posterior capsular perforation with vitreous exposure. In 5 cases out of 20 perforations with vitreous exposure, three-pieces IOL was implanted in the sulcus. In the remaining 15 patients, IOLs were implanted in the bag. Zonular dehiscence occurred in 9 patients, however, only 3 of them required capsular tension ring. Two IOLs with haptic fracture were explanted during the surgery and new IOLs were implanted in the capsular bag without any problem.

Early postoperative complications are described in Table 4.

Table 1. Concurrent eye and systemic pathologies

| Concurrent eye pathologies | Number of eyes (n=266) | Percentage of eyes (%) |
|---|------------------------|------------------------|
| Age Related Macular Degeneration | 77 | 11.1 |
| Glaucoma | 51 | 7.4 |
| Pseudoexfoliation | 43 | 6.2 |
| Non-proliferative Diabetic Retinopathy | 26 | 3.8 |
| Hypertensive retinopathy | 17 | 2.5 |
| Amblyopia | 15 | 2.2 |
| Myopia under -5.00 dyopters(D) | 14 | 2.0 |
| Corneal opacity | 9 | 1.3 |
| Myopia >5.00 D | 8 | 1.2 |
| Optic atrophy | 5 | 0.7 |
| History of central retinal vein occlusion | 1 | 0.1 |
| Total | 266 | 38.5% |

NPDR: Non proliferative diabetic retinopathy, HT: Hypertension, AC: Anterior chamber, PCP: Posterior capsular perforation, Psx: Pseudoexfoliation, PCO: Posterior capsular opacification, HM: Hand-motion

1mf: 1 meter finger count

3mf: 3 meters finger count

CME: Cystoid macular edema,

CNVM: Choroidal neovascular membrane

All cases of corneal edema were resolved with standard steroid treatment plus hyperosmolar solutions such as 5% NaCl in all eyes within a period of 2–3 weeks. All patients with transient IOP elevation were treated with topical antiglaucomatous drops within the first postoperative week. Of the 6 patients with narrow AC, 2 developed choroidal detachment. Choroidal detachments improved or complete resolution was obtained after medical treatment for about 2 weeks to one month in all cases. The other 4 patients with narrow AC healed with stromal hydration and double patching. The rest of the cortexes in 2 patients were aspirated with bimanual I/A under intracameral anesthesia.

Late postoperative complications are described in Table 5. All 9 IOLs (100%) with posterior capsular opacifications three months after the surgery were hydrophilic acrylic lenses. These 9 patients received YAG laser capsulotomy. Of the 8 patients with refractive errors, only 3 required glasses.

Over the course of the study, no serious complications during the first surgery necessitated the cancellation of the surgery for the other eye.

There were no cases during the study in which sight was threatened by complications such as endophthalmitis, retinal detachment, or suprachoroidal hemorrhage.

Discussion

Bilateral phacoemulsification was introduced during the regular cataract process in 1990s with encouraging initial results.⁵⁻¹⁶ A number of authors have reported their experiences with simultaneous bilateral cataract surgery with excellent results comparable to unilateral cataract surgery.⁵⁻¹⁵ Keskinbora is the first author who performed and reported the results of bilateral simultaneous cataract surgery from Turkey.^{3,5} However, similar to the worldwide tendency, this approach could not find enough supporters in Turkey, either. The results of a cataract survey performed among Turkish ophthalmologists demonstrated that only 4.5% of the surgeons performed bilateral simultaneous cataract surgery.¹⁷

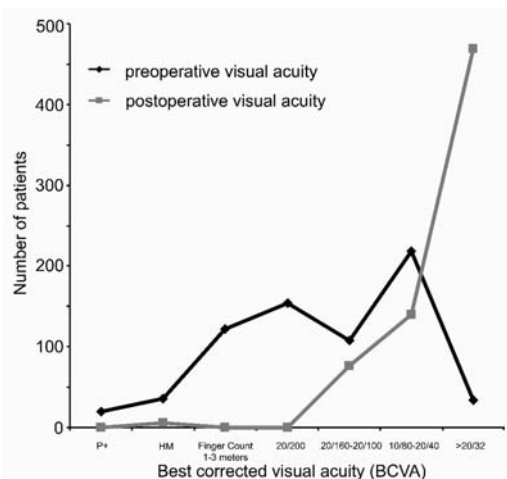


Figure 1. Pre and postoperative Best-Corrected Visual Acuity (BCVA) data

Table 2. The features of the 12 patients with decreased visual acuity after the surgery.

| Patient no | Sex | Age | Preoperative BCVA | Postoperative BCVA | Cataract type | Ocular and systemic comorbidity | Perioperative complication/ additional surgical intervention | Postoperative complication |
|------------|-----|-----|-------------------|--------------------|--------------------------------|--|--|--|
| 1 | F | 68 | 20/80 | 20/160 | Posterior subcapsular cataract | NPDR+ HT | PCP+vitreus exposure+ anterior vitrectomy | Macular hemorrhage |
| 2 | F | 68 | 20/80 | 20/160 | Posterior nodal cataract | Px | Non-dilated pupil, Pupillary dilatation with iris hooks | Posterior capsular plaque+Pupillary membrane |
| 3 | F | 69 | 20/40 | 20/200 | PSCC | Myopia> 5D | Deep AC, PCP + vitreus exposure+ anterior vitrectomy | CME+IOL decentralization |
| 4 | F | 71 | 20/100 | 20/200 | Dense nuclear cataract | Corneal opacity+ Narrow AC+ asthma+DM | CP+vitreus exposure+ P anterior vitrectomy | Descement tear, phaco burn, corneal edema |
| 5 | M | 72 | 20/100 | 3m fc | Dense nuclear cataract | DM, HT, BPH | iridodialysis | CME, vitreous hemorrhage |
| 6 | F | 74 | 20/32 | 20/40 | Severe cortical cataract | Psx+small pupil | PCP+vitreus exposure +anterior vitrectomy | PCO |
| 7 | F | 76 | 20/80 | 20/100 | Dense nuclear cataract | Psx+NPDR | Zonular dialysis+ nucleus drop | CME |
| 8 | F | 77 | 20/100 | 20/160 | Dense nuclear cataract | NPDR+Psx | PCP+vitreus exposure+anterior vitrectomy | CME |
| 9 | F | 79 | 20/100 | 20/200 | Severe nuclear cataract | Psx | Rest cortex | Iritis, Pupillary membrane+CME |
| 10 | M | 81 | 3m fc | 1m fc | Dense nuclear cataract | +glaucoma + small pupil Glaucoma | PCP + vitreus exposure+anterior vitrectomy | Central retinal vein occlusion +Macular hemorrhage |
| 11 | M | 83 | 3m fc | HM | Dense nuclear cataract | Psx | PCP+vitreus exposure+anterior vitrectomy | CME |
| 12 | F | 84 | 3m fc | HM | Severe cortical cataract | HT+ psx | Narrow AC | CNVM +vitreous hemorrhage |

NPDR: Non proliferative diabetic retinopathy, HT: Hypertension, AC: Anterior chamber, PCP: Posterior capsular perforation, PCO: Posterior capsular opacification, HM: Hand-motion, 1 mfc: 1 meter finger count, 3mfc: 3 meters finger count, CME: Cystoid macular edema, CNVM: C horoidal neovascular membrane

The intraoperative complication rates of simultaneous bilateral cataract surgery reported are between 0.25% and 7.7%^{3,11}, and are between 7% and 7.5% for unilateral cataract surgery from the data of 2 national surveys from the UK.^{18,19}

The incidence of intraoperative complications in our study was 7.2% (n=50), of which the ruptured posterior capsule with vitreous loss (n=20, 2.89%) and without vitreous loss (n=17; 2.45%) was the most encountered problem. The reported rates of posterior capsular rupture vary between 0.46% and 4.4% in most institutions.¹⁹⁻²¹

Vitreous exposure is the most important intraoperative complication which increases the risk of endophthalmitis 1.8

times to 16 times and also increases the risk of postoperative cystoid macular edema.²² Previously published rates of posterior capsular rupture and vitreous loss during phacoemulsification are between 1.4-5.2% and 0.7-2.3%²³⁻²⁵, and during extracapsular cataract extraction (ECCE) are between 0-8% and 0.09-3.3%, respectively.^{18,26-28} Potamitis and colleagues reported no complications among 66 cases of immediate sequential cataract surgery (ISCS).⁹

In the current study, the zonular dehiscence obstructing the surgery was the second most encountered problem (9 eyes; 1.3%). The zonular dehiscence incidence was reported to be between 0.46-0.67%.^{20,29} Pseudoexfoliation occurred in 6 of 9 eyes with zonular dialysis, while all had dense cataracts and were over 70 years of age. Patients with pseudoexfoliation are at an increased risk for the development of complications. Pseudoexfoliation occurred in 43 (6.2%) of 692 eyes. Abbasoglu et al., reported a 2.5-fold risk of vitreous loss in eyes with pseudoexfoliation.³⁰ Elderly age, high rate of pseudoexfoliation co-existence and a dense nuclear cataract were the most common types of comorbidities that may be responsible for the higher zonular dialysis rate and posterior capsular perforation with and without vitreous exposure in our study. The patient with nucleus drop in the second eye was a 76-year-old woman with a dense cataract and zonular dialysis of 270 degrees; the drop occurred during the rotation of the lens.

Arshinoff reported 1,020 consecutive patients (2,040 eyes) who underwent bilateral surgery.¹¹ Of 32 complications, 4 patients suffered posterior capsular ruptures, 1 with vitreous loss.¹¹ This complication rate is far less than in our study. However in Turkey, most of the elderly patients, especially in the rural areas, seek help only when their visual acuity decreases to the extent that they cannot perform their daily routines which in turn causes more dense and more mature cataracts. The mean age of our patients was 73.16 years. Higher patient age is a significant risk factor for intraoperative complications due to weaker zonules, denser cataracts, smaller pupils, and higher co-existence of systemic diseases such as diabetes, hypertension, and glaucoma. Two hundred eighty four (82%) of our patients were over 65 years old.

The main concern of the surgeons in regards to performing bilateral intraocular surgery was the doubled risk of complications, especially endophthalmitis, by performing two surgeries on the same person. The reported rates of unilateral endophthalmitis after bilateral cataract surgery is between 0.07-0.19%.^{7,8,15} Four cases of bilateral endophthalmitis encountered after bilateral simultaneous cataract surgery are reported in the literature.^{6,31-33} In these three cases, there were deficiencies in septic protocols such as using the same surgical instruments, using the same irrigation solutions or absence of prophylactic antibiotics.^{6,31,32} However, the last case of bilateral endophthalmitis was reported in 2008 although a separate septic protocol was used for each eye.³³ In the current study of 692 eyes, we had no endophthalmitis cases unilaterally or bilaterally to date. Although the rates of posterior capsular tear with and

Table 3. Intraoperative complications

| | Number of eyes (n=50) | Percentage of eyes (%) |
|--|-----------------------|------------------------|
| Posterior capsular perforation with vitreus | 20 | 2.89 |
| Posterior capsular perforation without vitreus | 17 | 2.45 |
| Zonular dehiscence | 9 | 1.30 |
| IOL haptic fracture | 2 | 0.3 |
| Iridodialysis | 1 | 0.14 |
| Nucleus drop | 1 | 0.14 |
| Total | 50 | 7.22 |

Table 4. Early postoperative complications (in the first week)

| Early Postoperative complications | Number of eyes | Percentage of eyes (%) |
|---|----------------|------------------------|
| Corneal oedema | 63 | 9.10 |
| Transient raised intraocular pressure | 31 | 4.48 |
| Narrow anterior chamber | 4 | 0.56 |
| Narrow anterior chamber+ choroidal detachment | 2 | 0.28 |
| Rest cortex in the anterior chamber | 2 | 0.28 |
| Total | 102 | 14.7 |

Table 5. Late postoperative complications (3rd month)

| Early Postoperative complications | Number of eyes | Percentage of eyes (%) |
|---|----------------|------------------------|
| Posterior capsular opacification | 9 | 1.30 |
| Unexpected refractive errors between +/-2 D | 8 | 1.15 |
| Membrane formation | 6 | 0.86 |
| Cystoid macular edema | 3 | 0.43 |
| Macular hemorrhage | 2 | 0.28 |
| IOL decentralization | 1 | 0.14 |
| Central retinal vein occlusion | 1 | 0.14 |
| Vitreous hemorrhage | 1 | 0.14 |
| Total | 31 | 4.44 |

without vitreous exposure in our study seem to be higher than in the literature, our patients were protected from the horrifying complications of endophthalmitis (unilateral or bilateral) due to the routine use of povidone-iodine and with the appropriate draping of the surgical field excluding the eyelashes and the use of 1 mg in 0.1 mL of intracameral cefuroxime at the end of the surgery. The recently published incidence rates of postoperative endophthalmitis after immediate sequential bilateral cataract surgery (ISBCS) were reported by Archinoff and Bastianelli to be 1 in 5759 cases with a reduction to 1 in 14352 cases with intracameral antibiotics.³⁴ For unilateral cataract surgery, reported rates of postoperative endophthalmitis range from 0% to 0.20% after uneventful phacoemulsification but may increase to 2.0% to 2.42% in complicated cases^{12,14,22,35-38} and endophthalmitis associated with simultaneous bilateral cataract surgery has been reported to occur in 0% to 0.19% of eyes.^{7,8,14,39,40} The European Society of Cataract and Refractive Surgeons (ESCRS) study demonstrated that a single dose of 1 mg in 0.1 mL of intracameral cefuroxime at the conclusion of surgery reduced the risk of endophthalmitis by a factor of almost five, from 0.34% down to 0.07%.⁴¹

Nuclear drop is the other important and frightening complication in cataract surgery. In one patient who had diabetes mellitus and pseudoexfoliation, a nuclear drop with zonular dehiscence of nearly 270 degrees occurred during the operation of the second eye, after the uncomplicated regular cataract surgery of the first eye. We finished the surgery and left the patient aphacic. Later on, posterior vitrectomy and scleral fixated IOL implantation were performed. However, on the follow-up, she developed cystoid macular edema (CME) and lost 2 lines of visual acuity compared to the preoperative visual acuity assessment. If nuclear drop had occurred during the first operation, we would have cancelled the operation of the second eye.

Suprachoroidal hemorrhage rates vary depending on the method used for cataract extraction, and the criteria used for diagnosis. We have been able to find some reports of bilateral suprachoroidal hemorrhage associated with cataract surgery.⁴²⁻⁴⁴ There were no cases of suprachoroidal hemorrhage associated with simultaneous bilateral phacoemulsification or ECCE.^{7-11,45}

The final BCVA increased in 633 (91.5%) eyes, decreased in 12 (1.7%) eyes, and remained the same in 47 (6.8%) eyes. As can be seen easily from the preoperative VA data, in Turkey, patients suffer long waiting times for cataract surgery which leads to very hard, dense cataracts and increases the risk of zonular dehiscence which may obscure the surgery and lead to higher peri- or postoperative complications.

We conclude from the results of this study that if each eye is treated as a completely separate procedure in experienced hands with the application of strict exclusion criterion, bilateral phacoemulsification in selected cases may be another option for speeding up visual rehabilitation of patients with bilateral cataracts. This can reduce costs both for the general healthcare system and the patient and is not disadvantageous compared with the reported results and complication rates of separate

bilateral cataract surgery. Since the risk of bilateral complications cannot be disregarded, we, of course, can not recommend simultaneous bilateral surgery to all patients without balancing risk factors to advantages.

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