I began to practice routine bilateral cataract surgery in 1996, encouraged by a 35-year-old race car driver who advised me that, if I would not do it for her, she would simply go elsewhere. Having been to other surgeons, she was aware of the risks purported to attend the surgery but was unwilling to undergo two unilateral procedures for her bilateral cataracts. Her attitude caused me to rethink the paradigms I had been taught as a resident. Was there really a good reason not to perform same-day bilateral modern phacoemulsification with in-the-bag posterior chamber IOL implantation, or were we just following the supposed wisdom of our forbearers who did not have access to technology and techniques remotely as safe and effective as those currently available?

At present, immediate sequential bilateral cataract surgery (ISBCS; the preferred term) is rapidly increasing in popularity worldwide. The government of Spain has recently recognized ISBCS to be as safe and effective as two unilateral procedures, or delayed sequential bilateral cataract surgery (DSBCS).1 Approximately 10% of European cataract surgeons routinely perform ISBCS, with the highest rates in Finland and Sweden; in Ontario, Canada, more than 2.5% of cataract procedures are performed as ISBCS, and in the United States, 5% of American Society of Cataract and Refractive Surgery (ASCRS) members routinely perform refractive lens procedures as ISBCS.2 Today, the International Society of Bilateral Cataract Surgeons (iSBCS, www.isbcs.org) has members in Canada, the United Kingdom, Australia, the United States, Spain, Sweden, Finland, Belgium, India, Korea, Portugal, Syria, Malaysia, Norway, and Switzerland, among other countries.

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Controversies in Bilateral Cataract Surgery

More ISBCS cases can be performed daily compared with DSBCS.

JUSTIFICATION

Many reasons have been cited for performing ISBCS.3-6 After ISBCS, patients experience almost immediate visual rehabilitation, whereas DSBCS patients experience loss of true binocularity until surprisingly long after recovery from second-eye surgery.3 Additionally, fewer medical visits are required with ISBCS (40% fewer visits, according to most studies), yielding happier patients and happier family members who transport them.

ISBCS also yields efficiencies in the operating room (OR) and less hurried cataract surgery days. More ISBCS cases can be performed daily compared with DSBCS, and calmer care can be given to patients in a less harried ISBCS day.4 Additionally, ISBCS reduces patient fear and is preferred for patients needing general anesthesia or other special accommodations for surgery.

Surgeons who frequently practice ISBCS are usually willing to operate on an amblyopic or previously injured eye, often yielding surprisingly good results. In most cases, these eyes would be left functionally blind or cosmetically poor by surgeons who do not perform ISBCS and are unwilling to take a patient to the OR for the sake of an eye with a marginal prognosis. ISBCS also saves the medical system huge amounts of money (billions of US dollars per

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potential case of bilateral endophthalmitis—a mathematical risk that would also happen with DSBCS, only at different times), which, although not a reason to judge any medical procedure, is important in the current worldwide financial crunch in medicine.\(^5\)\(^6\)

**OBJECTIONS TO ISBCS**

Despite the benefits laid out above, a number of (loud) objections have been raised against ISBCS, giving rise to broad controversy. These objections deserve to be reviewed:

No. 1: The preferred practice documents of many countries do not recognize ISBCS as a standard form of practice. Preferred practice documents recount the current state of practice; however, they are written about 1 year before they are published and therefore cannot encompass a new procedure as accepted standard practice. For example, IOLs and, more recently, intravitreal antiangiogenic injections for retinal disorders were not

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**PRINCIPLES FOR EXCELLENCE IN ISBCS**

1. Cataract or refractive lens surgery should be indicated in both eyes.
2. Any concomitant relevant ocular or periocular disease should be managed.
3. The complexity of the proposed ISBCS procedure should be easily within the competence of the surgeon.
4. The patient should provide suitable informed consent for ISBCS, being free to choose ISBCS or DSBCS.
5. The risk for right-left eye errors should be minimized by listing all surgical parameters (selected IOL, astigmatism, etc.) for both eyes on a board visible to all in the OR at the beginning of each ISBCS case. The World Health Organization operative checklists should be used if possible.
6. IOL power errors are minimized by having OR personnel familiar with the calculation methods used. The original patient charts should be available in the OR, and everybody passing the IOL to the surgical table should confirm the IOL choice. ISBCS nursing staff should be specifically trained and experienced.
7. Complete aseptic separation of the first- and second-eye surgeries is mandatory to minimize the risk of postoperative simultaneous bilateral endophthalmitis.
   A. Nothing in physical contact with the first-eye surgery should be used for the second-eye surgery.
   B. The separate instrument trays for the two eyes should go through complete and separate sterilization cycles with indicators.
   C. There should be no crossover of instruments, drugs, or devices between the two trays for the two eyes at any time before or during the surgery of either eye.
   D. Different ophthalmic viscosurgical devices and different manufacturers or lots of surgical supplies should be used whenever reasonable (where the device or drug type has ever been found to be causative of endophthalmitis or toxic anterior segment syndrome) and possible (if different lots or manufacturers are available) for the right and left eyes.
   E. Nothing should be changed with respect to suppliers or devices used in surgery without a thorough review by the entire surgical team to assure the safety of proposed changes.
   F. Before the operation of the second eye, the surgeon and nurse shall use acceptable sterile routines of at least regloving after independent preparation of the second eye’s operative field.
   G. Intracameral antibiotics have been shown to dramatically reduce the risk of postoperative endophthalmitis. Their use is strongly recommended for ISBCS.
8. Any complication with the first-eye surgery must be resolved before proceeding. Patient safety and benefit is paramount in deciding to proceed to the second eye.
9. ISBCS patients should not be patched. Postoperative topical drops are most effective immediately postoperatively and should be begun immediately postoperative, in high doses, which can be tapered after the first few days. Other ophthalmic medications (eg, for glaucoma) should be continued uninterrupted.
10. Surgeons who perform ISBCS should routinely review their cases and the international literature to be sure that they are experiencing no more than acceptable levels of surgical and postoperative complications. Membership in the International Society of Bilateral Cataract Surgeons (www.ISBCS.org) is highly recommended to keep abreast of the latest ISBCS information.

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accepted just before they became standards of practice.  

No. 2: Postoperative bilateral retinal detachment has been stated as an unacceptable risk of ISBCS. Retinal detachment generally occurs months or years after cataract surgery and most commonly occurs in an identifiable population of white males with preoperative refractions of -4.00 to -8.00 D of myopia. The timing of postoperative detachments makes it irrelevant whether the patient’s two operations occur 3 minutes or 3 months apart, and the fact that the population most at risk is identifiable enables pre- and postoperative retinal assessments for prophylactic treatment of the high-risk group, if needed.  

No. 3: Bilateral cystoid macular edema (CME), diabetic macular edema, and corneal decompensation (in eyes with Fuchs dystrophy) have been cited as other significant risks. The majority of surgeons who perform ISBCS agree that each of these entities is a specific relative contraindication for ISBCS. However, of these, only CME can be unpredictable, and most ISBCS surgeons give perioperative NSAIDs to minimize that risk. In reality, having performed ISBCS on more than 7,000 eyes, I have found that bilateral significant CME sufficient to impair the patient’s normal activity has yet to occur in my practice.  

No. 4: IOL power errors that may occur with the first surgery cannot be detected before the second. I have only had to exchange an IOL half a dozen times (less than one case in 1,000), almost all of which occurred before the advent of partial coherence interferometry and the introduction of the Haigis equations and the ASCRS calculator for use after refractive surgery. Furthermore, these IOL exchanges were required in extreme hyperopes or high myopes in whom the fovea was on the slope of a staphyloma. In almost all of these cases, data from one eye would not have helped for the other. Simply put, adjustments to correct IOL power errors in the first eye for the second-eye surgery are not a significant problem in bilateral cataract surgery.  

No. 5: Bilateral toxic anterior segment syndrome (TASS) has been cited as a possible risk. TASS usually occurs when something in the surgical protocol has changed, such as the source of balanced saline solution or the type of gloves used by the OR staff. However, TASS has not been reported with ISBCS to date. In our recent study of almost 100,000 ISBCS cases, there were no reports of TASS. Article 7E of the ISBCS General Principles for Excellence in ISBCS 2009 (See Principles for Excellence in ISBCS) specifically states that “nothing should be changed with respect to suppliers or devices used in surgery without a thorough review by the entire surgical team to assure the safety of proposed changes.”  

No. 6: The largest issue with respect to ISBCS has been the potential of simultaneous bilateral endophthalmitis (SBE). I speak about ISBCS at ophthalmic conferences all over the world; at nearly every meeting, someone opposed to ISBCS has gotten up and stated that he or she would never perform ISBCS because, if even one patient suffered SBE, the catastrophe would be unbearable for both the patient and the doctor. I recall speaking at the New England Ophthalmological Society as the guest of honor in December 2001. To my great surprise, during my lecture on ISBCS, in the front row was seated a team of Boston litigation lawyers who had been invited to attend and comment on my presentation. The audience expected the lawyers to vilify me and ISBCS, but the comments from a representative of the legal team were encouraging. In short, the lawyers recognized that, as with any surgical procedure, ISBCS carries significant risk of morbidity not limited to vision loss. They acknowledged that, in the setting of properly documented informed consent, including the risks of the planned surgery, ISBCS was not out of line with other new procedures being performed in the Boston area.

AVAILABLE EVIDENCE

Following the lawyers’ rationale, ISBCS should be judged on the available evidence and not fear of complications. In fact, ISBCS surgeons are among the most accomplished cataract surgeons with low complication rates. We commonly adopt extra precautions, such as those suggested in the General Principles for Excellence in ISBCS 2009, and we frequently perform our most difficult cases (which may be expected to have a higher infection rate) as DSBCS.

I participated in the most complete study of infection after ISBCS. In 95,606 eyes undergoing ISBCS, the infection rate was 1:5,759 for all cases, 1:1,987 for cases not receiving intracameral antibiotic prophylaxis (IC), and 1:14,352 for cases receiving IC with cefuroxime, vancomycin, or moxifloxacin. These infection rates are dramatically lower than the weighted average of all the IC cephalosporin studies (ESCRS) study of endophthalmitis (1:1,621) and lower than the weight of the latest IC studies reported from Europe in the past decade, which includes 55,948 cases with an IC infection rate of 1:1,977.

These numbers present an achievable goal for all cataract surgeons. All of the infections in our study were unilateral, and no cases of SBE occurred. In the literature, four cases of SBE have been reported between 1978 and 2008. In every case, there was a significant lapse in sterile protocol, and the ISBCS general principles were not followed. Members of ISBCS strongly recommend that surgeons new to ISBCS follow these recommendations.
RISK FOR SBE

Using the following formula, SBE Risk = (unilateral surgery risk) x linkage factor, where the unilateral surgery risk is equivalent to the infection rate in our study (1:14,352). I calculated the approximate risk for SBE when the iSBCS general principles are followed and IC antibiotics are used. The linkage factor represents the extra risk for the second eye in a bilateral case when the first eye was infected. In reviewing the literature and in the experience of iSBCS members, I do not believe the linkage factor would exceed 3. Therefore, the risk for SBE in ISBCS can be assigned a best estimate of approximately 1:70 million.

Choosing an intracameral antibiotic is a challenge, as cefuroxime, vancomycin, and moxifloxacin have all been shown to be effective, but none is significantly superior to another. As we found in our study, there are a number of reasons to prefer moxifloxacin. Moxifloxacin and vancomycin have broader spectra of activity against common endophthalmitis pathogens and less reported resistance than cefuroxime. Unlike the others, moxifloxacin demonstrates dose-dependent rather than time-dependent kinetics in bacterial killing, and antinuclear rather than anticell-wall efficacy. It has a low risk of allergy (especially compared with the cephalosporins) and is the simplest to prepare, making dilution errors unlikely. Importantly, in the unfortunate but ultimately inevitable periodic event of failure, moxifloxacin is most likely to yield a resistant strain of Staphylococcus, which will probably be sensitive to the usual antiendophthalmitis drugs of choice, vancomycin and ceftazidime, which act by mechanisms different from those of moxifloxacin. It is microbiologically more logical to use an agent for prophylaxis that is unrelated chemically and by mechanism of action to the current endophthalmitis drugs of choice, vancomycin and ceftazidime, reserving them for rare failures, than to use our agents of last resort, vancomycin or cefuroxime (chemically and microbiologically similar to cefuroxime) as primary prophylactic agents. Finally, even dilute moxifloxacin has a faint yellow color, making administration of the wrong syringe from the nurse’s table unlikely.

CONCLUSION

There is no evidence that ISBCS is unsafe. The history of the world has shown that life tends toward ever-increasing complexity, as long as the summation of simpler units merging into a more complex unity shows ultimate benefit. Our history in ophthalmology of incorporation of IOL implantation into cataract surgical procedures is a typical example of this.

ISBCS has not been shown to have any demonstrable downside. It does, however, provide many benefits for the patient, for the patient’s caregivers, and for society, as it saves huge amounts of money that can be spent for more cataract procedures or other health needs. The only incontrovertible downside is that, in many jurisdictions, surgeons are paid less for the second eye for the first, essentially penalizing them for performing ISBCS. No matter how you look at this, it is an incredibly foolish policy. We have a safe procedure, with many benefits for the patient, and we discourage it by penalizing the surgeon who performs it. It would simply be a lot smarter to reward surgeons for ISBCS, thus sharing a small amount of the savings society reaps with the individual who is responsible for those savings. It is not surprising that penalized surgeons are reluctant to perform ISBCS. Therein lies the real root of the controversy and argument about ISBCS.

TAKE-HOME MESSAGE

• ISBCS should be judged on the available evidence and not fear of complications.
• Members of the iSBCS strongly recommend that surgeons new to ISBCS follow the recommendations outlined in the General Principles for Excellence in ISBCS 2009.
• The risk for SBE in ISBCS is estimated at approximately 1:70 million.

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