ORIGINAL ARTICLE

# Safety of Simultaneous Bilateral Intraocular Surgery Under General Anesthesia in Pediatric Patients

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## ABSTRACT

**Objective:** To evaluate the risks and benefits of simultaneous bilateral intraocular surgery (SBIS) in pediatric patients at a university hospital in the Kingdom of Saudi Arabia, who are placed under general anesthesia for the procedure.

**Methods:** This retrospective, noncomparative case study comprised 15 children, who underwent bilateral cataract surgery and/or primary or secondary intraocular lens (IOL) implantation in one sitting between November 2008 and July 2014. Seven patients had bilateral lensectomy primary posterior capsulotomy and anterior vitrectomy, and the remaining eight patients had bilateral IOL implantation at the capsular bag either primarily IOL implantation (two cases) at the time of cataract extraction or secondary IOL implantation at the capsular bag (six cases). Bilateral surgeries were performed sequentially by the same surgeon, with strict aseptic separation of the two surgeries, while the patient was under general anesthesia.

**Results:** The age of the patients at the time of the surgery ranged from 7 months to 9 years (mean age 2.13 years). The patients were followed up approximately for 4 months postsurgery. There were no catastrophic complications from the anesthesia (death, asphyxia, cardiac or respiratory arrest, or seizures) nor were there any intraoperative complications that necessitated cancelation of surgery in the second eye. Postoperatively, one patient was noted to have reproliferation of lens material in one eye. However, no serious postoperative complications such as endophthalmitis, aphakic glaucoma, and hyphema were noted.

**Conclusion:** SBIS conducted during the same operative procedure is an alternative to sequential surgery in selected pediatric patients if operative guidelines and surgical asepsis are strictly followed.

**Key words:** Bilateral cataract surgery, endophthalmitis, general anesthesia, lensectomy, simultaneous intraocular surgery

ملخص البحث:

هدفت هذه الدراسة إلى تقييم الفوائد والمخاطر لإجراء عملية جراحية للعينين في وقت واحد للأطفال في مستشفى جامعي في المملكة العربية السعودية أجريت الدراسة على 15 طفل خضعوا لجراحة الماء الأبيض وزراعة عدسة داخل العين – تمت متابعة هؤلاء الأطفال لمدة 4 أشهر بعد الجراحة. لم تحدث مضاعفات كارثية خلال التخدير أو مضاعفات أثناء العملية توجب إلغاء العملية الجراحية في العين الثانية. لوحظ أن هناك تكاثر للألياف خلف العدسة في عين واحدة عند احد المرضى. ومع ذلك، لم تلاحظ أي مضاعفات جراحية خطيرة بعد العملية، مثل التهاب باطن المقلة، الماء الأزرق، أو نزيف في الحجرة الأمامية من العين، نستنتج من هذه الدراسة أن الجراحة التي تجرى في العينين في آن واحد هي بديل لعملية جراحية متتابعة للأطفال إذا تم إتباع المبادئ التوجيهية المنصوص عليها بدقة.

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## INTRODUCTION

Pediatric cataract is one of the major causes of preventable childhood blindness, affecting approximately 200,000 children worldwide, with an estimated prevalence ranging from 3 to 6/10,000 live births.[1,2] Early diagnosis and treatment are of crucial importance to prevent the development of irreversible stimulus-deprivation amblyopia.

Simultaneous bilateral intraocular surgery (SBIS), defined as sequential bilateral intraocular surgery completed in one visit to the operating room, has advantages and disadvantages that must be carefully weighed and discussed by the surgeon and patient's guardians. SBIS is growing in popularity, as it is now becoming an accepted way of managing patients with bilateral cataract.[3,4] Although there are several publications of SBIS in children,[5-9] it remains a controversial issue. The main indications that have been reported for simultaneous bilateral cataract surgery (SBCS) include the need for general anesthesia in the presence of bilateral visually significant cataracts, other occasions where travel for surgery and follow-up care is a significant hardship for the patient, and when the health of the patient may limit surgery to one surgical encounter.[3,10] In the published reviews, bilateral complications were rare.[2,4]

Serious complications such as endophthalmitis, expulsive hemorrhage, and retinal detachment makes ophthalmologists hesitant to perform SBIS.[7,11] Another reason is the inability to adjust intraocular lens (IOL) power for the second eye on the basis of the results from the first eye surgery.[12,13] The advantages of SBIS may include reducing the risk of two separate episodes of general anesthesia and minimizing the risk of monocular stimulus-deprivation amblyopia. This reduces expenses for the patient, hospital, and society and also reduces the time and risk to the patient and family associated with traveling to and from the hospital. The question is whether the benefits of bilateral surgery justify the risk of simultaneous complications, particularly endophthalmitis. In this retrospective, noncomparative case series study, we have presented the advantages and disadvantages of such surgical procedures.

## METHODS

This retrospective, noncomparative case study comprised 15 patients who underwent bilateral cataract surgery (BCS) and/or primary or secondary IOL implantation in one sitting between November 2008 and July 2014 at University Hospital, Kingdom of Saudi Arabia (KSA). All information was taken from the patient's medical records. The inclusion criteria in this study were pediatric patients with congenital cataract without other ocular anomalies, who had undergone BCS either as a primary or secondary surgical procedure. Bilateral surgeries were performed sequentially by the same surgeon, with strict aseptic separation of the two surgeries, while the patient was under general anesthesia. All patients received preoperative prophylactic topical antibiotic, postoperatively topical antibiotic and steroid, and were followed for 4 months or more postoperatively. Exclusion criteria included immunocompromised patients, complex eye issues such as anterior segment dysgenesis, uveitis, and risk factors that render the patients to infections of the ocular surface, and if the patient had undergone previous cataract surgery elsewhere.

In all cases of SBIS, once the patient was delivered to the operating room, the first eye was prepped and draped in the usual sterile ophthalmic fashion. After successful completion of surgery on the first eye, subconjunctival injections of antibiotic and steroid were given. The second eye was then prepped and draped and treated as a separate surgical procedure. This entailed the surgeon and assisting nurse rescrubbing and changing gowns and gloves. A second set of sterile instruments and disposable surgical items and fluids were used for the second eye. At the end of intraocular surgery on the second eye, subconjunctival antibiotic and steroid injections were given, drapes removed, and an eye shield was placed over each eye.

## RESULTS

The medical records of 15 patients who underwent SBIS were reviewed. The mean age was 2.13 ± 1.96 (range: 0.6–9) years. All of them had bilateral congenital cataract with or without delayed milestones. Eight patients had only bilateral congenital cataract (53.3%) while two had bilateral congenital cataract with delayed milestones (13.3%). Four patients had bilateral congenital cataract with delayed milestones and epilepsy (26.7%). One patient had Down syndrome (6.7%). The indication for SBIS was to improve the vision in six patients (40.0%) who had to wear aphakic glasses and one patient (6.7%) who could not tolerate a contact lens. In eight patients (53.3%), it was to rehabilitate the visual system in both eyes.

Six patients underwent secondary IOL implantation at the capsular bag (40%). Seven patients had bilateral lensectomy with posterior capsulotomy and anterior vitrectomy (46.7%),

and two patients had bilateral lensectomy with posterior capsulotomy and anterior vitrectomy with primary IOL implantation at the capsular bag (13.3%).

In the presented group of pediatric patients, there were no serious complications from anesthesia (death, asphyxia, cardiac and respiratory arrest, or seizures). No catastrophic intraoperative complications from the surgery occurred in the first eye that necessitated canceling surgery in the second eye (expulsive hemorrhage, retinal detachment, and suprachoroidal hemorrhage). All the patients were followed for at least for 4 months to determine whether there were any postoperative complications. Postoperatively, one patient who underwent bilateral lensectomy, posterior capsulotomy, and anterior vitrectomy was noted to have reproliferation of lens material in one eye.

## DISCUSSION

In this retrospective case study, we reviewed the records of 15 patients who underwent BCS with primary or secondary IOL implantation in one sitting. No catastrophic intraoperative or postoperative complications from the surgery occurred in either eye. Though SBIS is a controversial issue, it is of importance to assess the risks and benefits for each patient whenever SBIS is considered. In our experience, the decision to perform SBIS was based on a case-by-case basis, after careful consideration of the risks and benefits. Same-day or immediately sequential, BCS is being practiced with increasing frequency worldwide.[5-9] It is believed to offer several benefits for the patient and the patient's family, including greater convenience and it aims to repair the visual system, rather than one eye, by restoring normal binocularity. Another speculated advantage for SBIS is the reduction in expenses it offers to the patient, the medical system, and therefore to society.

Our results are in line with another retrospective case study from King Khalid Eye Specialist Hospital, Riyadh, KSA, where simultaneous bilateral lensectomies were performed in nine children due to anesthetic risks. Postoperative complications were seen after a period of 6 months, and the author recommended that simultaneous removal of bilateral infantile cataracts should probably be reserved for selected cases where the anesthetic risk is higher than average.[14]

We considered SBIS in children with bilateral congenital cataracts; bilateral aphakia who are at higher risk for anesthesia-related complications; and families with complex life circumstances, such as travel and financial issues that prevented them from returning to the hospital multiple times within a short period. Modern cataract surgical techniques and equipment allow the procedure to be completed in both eyes in one visit to the operating room, which reduces the length of hospitalization and the risk of endophthalmitis.[12]

SBIS in children has been studied by several authors.[5,6,8,9,14,15] In a large study that included 109 simultaneous bilateral primary combined trabeculotomy-trabeculectomy for developmental glaucoma, there was no sight-threatening complication, including endophthalmitis. Observed complications were mainly anesthetic-related. Apnea occurred in 17 (15.6%) patients, and all were successfully resuscitated. The most serious postanesthetic complication was a cardio-pulmonary arrest that occurred 5 h postoperatively following aspiration during feeding in one child. Two children had delayed recovery. None of these SBIS cases resulted in bilateral catastrophic complications.[16]

The incidence of endophthalmitis following pediatric anterior segment surgery is currently unknown. In a survey, over 500 pediatric ophthalmologists and glaucoma specialists were questioned on their knowledge of or involvement with, endophthalmitis following pediatric intraocular surgery. The incidence of endophthalmitis was 0.071% or 7 cases per 10,000 which is similar to that reported following adult extracapsular cataract extraction.[17]

Gradin and Mundia compared SBCS and sequential surgery and reported that the incidence of early endophthalmitis in all cases of pediatric cataract surgery over the 11-year period was 0.16%, while anesthetic-related death was 0.11%. They concluded that bilateral simultaneous pediatric cataract surgery with IOL implantation may be a safe alternative to sequential surgery, with advantages in cost reduction and no difference in sight-threatening complications.[18]

In Wills Eye Hospital, Philadelphia, United States, a retrospective study survey of 16 cases underwent simultaneous surgery for bilateral dense congenital cataracts. The study recommended SBIS for infants with bilateral dense cataract to avoid a second general anesthesia to reduce anesthetic risk, hospital stay, cost, and furthermore, it would allow earlier optical correction.[15]

From the author's experience, the advantage of SBIS is that it minimizes the risk of monocular stimulus-deprivation amblyopia in cases where the second eye procedure is delayed for an extended period after the first surgery because of familial, logistical, or health complications. In

these instances, there is a significant amblyogenic risk for the second eye. The other advantage is the avoidance of general anesthesia in high-risk children. Bilateral IOL implantation was safe and produced good visual results in children of all ages with bilateral cataract.[19]

A review of 40 patients with bilateral congenital cataract (80 eyes), who underwent cataract extraction on both eyes in a single surgical session, assessed the efficiency of the surgery for patients with a high risk for general anesthesia. The review reported that good vision through corneal lenses was achieved in all patients. Eight patients had postoperative complications; the formation of secondary membranes in five patients, and secondary glaucoma in three patients. No cases of endophthalmitis were reported.[6]

The most serious postoperative complication threatening vision is endophthalmitis. Bilateral endophthalmitis after SBCS has been reported.[17,18] However, endophthalmitis was not seen in many reports.[5,6,8,14,15] Our results are in agreement with this observation.

There are studies that do not support SBIS because of the possibility of affecting the visual outcome due to the inability to assess the postoperative refractive status and alter IOL choice.[12] In addition, recovery may be prolonged from corneal edema, anterior chamber inflammation, or cystoid macular edema. Allowing the patient to maintain visual function in one eye during the recovery of the other eye can be important. Benefits of sequential surgery include assessment of the outcome of the first surgery to tailor the surgical technique, IOL power, and choice of IOL for the second surgery.[12] IOL power error that may occur with the first eye surgery has also been raised as an issue. The IOL power error in the first eye could be refined and thereby prevented in the second eye by adjusting the IOL power to improve the refractive prediction on the basis of the result from the first surgical procedure.[12,13]

## CONCLUSION

In summary, SBIS is being practiced with increasing frequency worldwide. It provides many advantages including convenience for the patient and the patient's family where travel for surgery and follow-up care is a significant hardship for them. And also when the health of the patient may limit surgery to one surgical encounter under general anesthesia in the presence of bilateral visually significant cataracts. BCS and/or primary or secondary IOL implantation in one session is a safe alternative to sequential surgery if operative guidelines and surgical aseptic techniques are strictly followed.

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## Conflicts of interest

There are no conflicts of interest.

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