

Unplanned returns to the operating room within three months of pediatric cataract-related intraocular surgery: indications and risk factors



Colette M. Jackson, MD, Matthew Bickford, MD, Rupal H. Trivedi, MD, MSCR, and M. Edward Wilson, MD

PURPOSE	To evaluate the indications and associated risk factors for unplanned returns to the operating room within 90 days of pediatric cataract-related surgery.
METHODS	The medical records patients undergoing either cataract extraction or secondary intraocular lens (IOL) implantation at a single center from 1991 to 2018 were reviewed retrospectively.
RESULTS	A total of 1,392 eyes of 989 patients were included, with 48 unplanned reoperations in 46 eyes of 43 patients, yielding a reoperation rate of 3.3% (46/1392) for one reoperation and 0.14% (2/1392) for two within 90 days of surgery. Of the 48 reoperations, indications for reoperation were as follows: lens cortex reepithelialization (n = 14), elevated intraocular pressure (n = 11), inflammatory pupillary membranes (n = 7), vitreous wick to the cataract surgery wound (n = 6), synechiae (n = 3), uveitis (n = 3), posterior capsule opacification in an eye with intact posterior capsule (n = 1), retained cortex (n = 1), traumatic iris prolapse (n = 1), and foreign body in anterior chamber (n = 1). Risk factors for an unplanned reoperation included a history of traumatic cataract (relative risk, 2.55) or age <1 year at time of first surgery (relative risk, 3.02). In the absence of these risk factors, the reoperation rate was 1.1%.
CONCLUSIONS	Unplanned reoperations after pediatric cataract surgery are uncommon, but when they occur it is often in the setting of trauma or surgery performed before the age of 1 year. (J AAPOS 2019;23:224.e1-4)

The surgical management of congenital, infantile, and childhood cataracts is challenging. Compared to surgery for age-related lens changes in the elderly, pediatric cataract surgery is fraught with a more robust postoperative inflammatory response, a greater tendency for lens cortex reepithelialization, a higher chance that an intact posterior capsule will become opaque after surgery, and a greater chance that the surgical wounds will leak if not sutured securely. In children, cataracts are also more likely to be associated with additional developmental eye abnormalities and systemic syndromes, which may complicate intra- and postoperative decision making. Finally, parental compliance with postoperative medications may influence the course of healing after surgery. Overall, the complications of pediatric cataract surgery have been well-researched¹; however, their type and inci-

dence in the immediate postoperative period have not. In particular, unexpected early postoperative complications requiring an additional urgent surgical intervention have not been well characterized. The purpose of this study was to identify reasons and associated risk factors for unplanned returns to the operating room within 90 days of cataract-related intraocular surgery in children. A 90-day postoperative time frame was selected because most insurance companies consider the postoperative “global period” to extend from time of surgery to 90 days postoperatively.

Subjects and Methods

This study was approved by the Institutional Review Board of the Medical University of South Carolina for Human Research. The medical records of patients undergoing either cataract extraction, with or without intraocular lens (IOL) implant, or secondary IOL placement between 1991 and 2018 at Storm Eye Institute were reviewed retrospectively. All surgery was performed by a single surgeon (MEW). Patients requiring an unplanned reoperation within 90 days of the initial surgery were selectively examined for indication for and timing of reoperation. Patients were excluded if a reoperation was anticipated preoperatively or related to a preexisting condition (for example, a patient with Lowes syndrome requiring subsequent glaucoma surgery). The records were also reviewed for any possible associations or risk factors for early and unplanned reoperations.

Author affiliations: Storm Eye Institute, Medical University of South Carolina, Charleston
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Correspondence: M. Edward Wilson, MD, 167 Ashley Avenue, Charleston, SC 29425
(email: wilsonme@musc.edu).

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Surgical Technique

For cases of infantile cataract extraction without IOL implantation, a central posterior capsulectomy was performed with a vitrector handpiece, and an anterior vitrectomy was also performed through this opening. For cases of cataract extraction with IOL implantation, the IOL was injected into the capsular bag followed by either a limbal or a pars plana approach posterior capsulectomy and vitrectomy. Posterior capsulectomy was performed for patients less than approximately 8 years of age (at which point the patient would be able, if indicated, to sit for YAG capsulotomy in clinic) and in all eyes with posterior polar or capsular cataract. Some eyes of patients >8 years of age had a manual posterior capsulorhexis without an anterior vitrectomy.

Results

During the selected time frame, 1,392 eyes underwent pediatric cataract and/or IOL implantation surgery and met inclusion criteria for analysis. A total of 48 unplanned reoperations occurred in 46 eyes of 43 patients, yielding a reoperation rate of 3.3% (46/1392). This included 2 patients undergoing bilateral reoperations and 1 patient undergoing 2 reoperations in the right eye and 3 reoperations in the left eye. This patient underwent bilateral cataract extraction without IOL implantation, at age 3.4 months for the right eye and 3.6 months for the left eye; examination under anesthesia at that time revealed enlarged corneal diameters (12 mm bilaterally) and long globe axial lengths (23.16 mm in the right eye and 23.03 mm in the left eye) for patient age. While preexisting glaucoma was likely present in this patient, it was not diagnosed preoperatively; thus, the patient's reoperations for trabeculotomy and Ahmed shunt are included in the unplanned reoperation rate. For reoperation cases, the initial surgery was cataract extraction in 41 eyes (41/46, 89%) and secondary IOL placement in 4 eyes (5/46, 11%). One eye had spontaneous total dislocation of the crystalline lens and received a primary iris-fixated (Artisan, Boca Raton, FL) IOL implantation without undergoing lensectomy or cataract removal.

The most common indication for reoperation was lens cortex reepithelialization, occurring in 14 eyes. The majority of reoperations (85%) for this indication occurred in patients who underwent surgery at age <1 year. Among this age group, a total of 467 eyes underwent cataract-related surgery, with 284 eyes left aphakic and 183 eyes receiving IOL implant. Of the 12 reepithelialization reoperations occurring in eyes in this group, 8 cases occurred in eyes left aphakic (8/284 [2.8%]) at the time of cataract surgery, and the remaining 4 had primary IOL implantation (4/183 [2.2%]).

Regarding reoperations for elevated intraocular pressure (IOP), 7 of 11 reoperations during the 90-day time frame were for aphakic/pseudophakic open-angle glaucoma. This included bilateral surgery in 2 patients, 1 of whom (mentioned above as likely having undiagnosed preexisting glaucoma prior to cataract surgery) underwent trabeculotomy in both eyes as well as subsequent Ahmed tube shunt

placement in one eye within the 90-day time frame. Apparent pupillary-block glaucoma developed in 3 of the 11 eyes. One eye with an iris-fixated IOL (Artisan) had a nonpatent peripheral iridectomy, and 2 eyes received surgical peripheral iridectomies after presenting with iris bombe. One of the iris bombe eyes had undergone surgery for traumatic cataract. Additionally, one patient with elevated IOP at postoperative day 1 required anterior chamber washout for retained ophthalmic viscosurgical device after medical management failed to lower the IOP.

Reoperation for vitreous wick to the wound was required in 6 eyes. No attempt was made with Nd:YAG laser to resolve a vitreous wick to cataract surgery wound; standard practice for this surgeon is to return to reoperate for vitreous wicks. Of the 6 patients, 5 were <8 years of age, and thus unlikely to sit for Nd:YAG laser treatment. Regarding possible associations, in 1 eye the IOL was injected upside down requiring it to be repositioned intraocularly; in another case, the cataract was noted to be traumatic, with capsular fibrosis. No other associations for vitreous wick to the wound were found; specifically, route of vitrectomy (anterior versus pars plana) or use of intracameral triamcinolone at the end of the case were not found to have any association with vitreous wicks.

Seven eyes underwent reoperation for removal of inflammatory pupillary membranes. No risk factors were identified for early formation of inflammatory pupillary membranes requiring reoperation. Specifically, these records were examined for documentation of patient/parent noncompliance with postoperative steroids; however, none of the affected patients' charts noted noncompliance.

Three eyes (including both eyes of 1 patient) underwent reoperation for postsurgical uveitis. One patient developed severe anterior uveitis in both eyes after sequential bilateral cataract surgery for which examination under anesthesia was performed to determine the cause of uveitis; sedated examination revealed no evidence of endophthalmitis, and the patient received subconjunctival triamcinolone acetate injection bilaterally for postsurgical uveitis. The second patient developed postoperative uveitis and hypotony after extraction of a juvenile idiopathic arthritis-related uveitic cataract; reoperation was undertaken for sub-Tenon's fascia injection of triamcinolone acetate.

Indications for reoperation stratified by patient age were also examined. For patients <1 year of age at initial cataract-related surgery, 12 of 25 cases of early and unanticipated reoperations were because of lens cortex reepithelialization. Of these 12, 8 were aphakic, and 4 received primary IOL implantation. All indications for reoperation in this age group are listed in [Table 1](#).

For patients ≥ 1 year of age, indications for reoperation were more varied (see [Table 2](#)); however, all cases of vitreous wick to wound occurred in this age group.

In summary, half of the reoperations occurred in patients <1 year of age. This was noted to be an independent risk factor for unanticipated reoperation within 90 days

Table 1. Unplanned returns to the operating room within 3 months after pediatric cataract-related intraocular surgery performed at <1 year of age^a

Indication for reoperation	No. eyes
Lens cortex reeproliferation	12
Increased intraocular pressure	8
Postsurgical uveitis	2 ^b
Inflammatory pupillary membranes	2
Retained cortex obstructing visual axis	1

^a25 eyes, including 2 patients undergoing reoperation bilaterally and 1 patient undergoing 2 reoperations bilaterally.

^bBilateral surgery in 1 patient.

(relative risk, 2.55). A history of trauma was also identified as a risk factor for early reoperation (relative risk, 3.02). In the absence of these risk factors, the reoperation rate was 1.1%.

Charts were also stratified by time to reoperation to determine whether any association existed between indication for and time to reoperation. No association was found. The mean time to reoperation for the 48 eyes requiring reoperation within 90 days was 46 days. Nine eyes (0.65%) required reoperation within 15 days of initial surgery, 15 required reoperations within 30 days (1.08%), and 32 eyes (2.3%) required reoperations within 60 days after initial surgery. No cases of endophthalmitis were identified.

For urgent, unplanned reoperations following secondary IOL placement, indications for return included vitreous wick to the wound in 1 eye, synechiae in 1 eye, traumatic iris prolapse in 1 eye, and foreign body or fiber in the anterior chamber in 1 eye.

Discussion

Early and unanticipated reoperations are uncommon after pediatric lens-related surgery. However, when it does occur, it is more common in patients <1 year of age at surgery and in patients with a history of traumatic cataract. Furthermore, if an early return to the OR occurs in patients <1 year of age, it is most likely to be for removal of lens cortex reeproliferation followed in frequency by management of elevated IOP. These results are similar to results published by Sachdeva and colleagues,² which also found that visual axis opacification and secondary glaucoma are the most common indications for reoperation after cataract surgery and that patient age <1 year is correlated with a higher rate of complications. Although follow-up in the study of Sachdeva and colleagues² occurred over a mean of 4.8 years, the median time of reoperation occurred 0.4 years after the initial operation, for a total reoperation rate of 5.5%.² When viewed in the context of the present research, it appears that most instances of reoperation will occur within the first few months after initial surgery. Such information is useful not only in terms of what to expect or examine closely during postoperative visits but also in terms of discussing expected outcomes with parents of patients.

Table 2. Unplanned returns to the operating room within 3 months of pediatric cataract-related intraocular surgery performed at >1 year of age^a

Indication for reoperation	No. eyes
Vitreous wick to wound	6
Inflammatory pupillary membrane	5
Synechiae	3 ^b
Increased intraocular pressure	3
Lens cortex reeproliferation	2
Uveitis	1
Posterior capsular opacification	1 ^c
Traumatic iris prolapse	1
Foreign body (fiber) in anterior chamber	1

^a23 eyes of 23 patients.

^b2 decentered IOL and 1 peaked pupil.

^cEctopia lentis with capsular tension ring placed at initial surgery, no posterior capsulectomy done at initial surgery.

There is little research investigating early reoperations after pediatric cataract-related surgery. Meeraalam and Khan³ reviewed all unplanned hospital readmissions for children in a large eye hospital. For those readmitted for a high IOP (12.8% of all readmissions), only 21% were after cataract surgery. The others were following retinal detachment or glaucoma procedures. For wound leak readmissions (17.6% of all readmissions), only 12% were after cataract procedures. Many more were the result of trauma repairs or corneal transplants. In the Infant Aphakia Treatment Study (IATS), 47% of infant eyes (aged 4 weeks to 7 months at time of cataract extraction) required surgical removal of a visual axis opacity during the first postoperative year.⁴ In this study, for patients <1 year of age at time of initial cataract-related surgery, 14 eyes underwent reoperation for visual axis opacities (either lens cortex reeproliferation or inflammatory pupillary membranes) within 90 days, for a reoperation rate of 1.6%. Although not directly comparable given the slight discrepancy in age range, this appears to suggest that most cases of visual axis opacification warranting surgical intervention will occur after the first 3 postoperative months. In our study, we selected 90 days after surgery as our review period to document those unplanned returns to the OR during the immediate postoperative “global” period rather than reoperations that occurred over time, after full healing, as the child grew and developed.

We were particularly interested in an analysis of early and urgent reoperations for elevated IOP during the initial healing period. In our study, 6 of 1092 eyes (0.5%) required reoperation within 90 days for aphakic/pseudophakic glaucoma, which is now being referred to as “glaucoma after cataract surgery.” Early reoperation for increased IOP implies a more direct causative relationship with the surgery or the inflammation created by it combined with any anatomic predisposition the eye may have. Glaucoma having an onset well after full healing may be less related to the surgery itself than to the anatomic predispositions. In the IATS, 4.4% of patient eyes required surgical management

for glaucoma within the first postoperative year, and 7% required surgery during the first 5 postoperative years.⁴ This gradual increase in number of cases requiring surgical intervention suggests that the development of glaucoma after cataract surgery (glaucoma in aphakic and pseudo-phakic eyes) has a large window, and that long-term monitoring is necessary. Similar findings regarding development of secondary glaucoma after cataract surgery have been published in other studies.^{5,6}

It is notable that no eyes in this series required urgent reoperation for acute postoperative endophthalmitis. Given the young age of patients in this study, it is likely that any concern for endophthalmitis would have prompted an examination under anesthesia for both diagnosis and treatment; therefore, most if not all cases of acute endophthalmitis would have been identified by reviewing reoperations during the 90-day global period. Patients undergoing surgical reoperation with an outside hospital provider or patients old enough to tolerate anterior chamber or vitreous tap and/or intravitreal injection would not have been identified by the methods of this study; however, it can be reasonably assumed that this would be a very small number of patients.

A full discussion of suggested methods for reducing or eliminating some of the causes for early reoperation after pediatric cataract-related surgery is beyond the scope of this paper. However, consideration can be given to the use of intracameral triamcinolone to better visualize vitre-

ous strands to the wound so they can be removed at surgery. In our study, this did not prevent all of the vitreous wick cases, because some of them received intracameral triamcinolone. Other suggestions include maximizing the use of anti-inflammatory medications after surgeries at higher risk for intense postoperative inflammation, complete removal of ophthalmic viscosurgical device (viscoelastics) at the end of surgery, and the use of prophylactic IOP-lowering medications when indicated or verifying the patency of a planned peripheral iridectomy.

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