

(18) Aphakic glaucoma after congenital cataract surgery with and without intraocular lens implantation

Jaskra w oku bezsoczewkowym po operacji zaćmy wrodzonej bez wszczepu sztucznej soczewki wewnątrzgałkowej i z jej wszczepem

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Summary: **Purpose:** To evaluate the incidence and individual risk factors for the development of aphakic glaucoma after congenital cataract surgery.
Material and methods: We retrospectively reviewed the records of 113 eyes of children who underwent surgery for cataract between 1998 and 2002. Outcome variables studied included intraocular pressure, number of medication changes required over the course of the follow-up, and surgical interventions required.
Results: We enrolled 113 eyes who had cataract extraction with IOL (101 eyes), or lensectomy with anterior vitrectomy (12 eyes). Median age during cataract surgery was 11.5 months. The median time to development of postoperative glaucoma was 3.2 years (range, 6 months – 10 years). Mean post cataract surgery follow-up was 6.2 years. Postoperative glaucoma developed in 9.7% of eyes of children with cataract. Postoperative open-angle glaucoma developed in 6 pseudophakic eyes and in 2 aphakic eyes; postoperative closed-angle glaucoma developed in 3 aphakic eyes. The mean follow-up period after the diagnosis of glaucoma was 3.8 years. During the course of follow-up, all of 11 eyes required 1-3 medication changes for controlling glaucoma and 3 of them (31.4%), required surgical intervention.
Conclusions: Despite modern surgical techniques the incidence of aphakic glaucoma must be considered in all patients after pediatric cataract extraction. Our results show the importance of careful follow up of intraocular pressure after cataract surgery in children. Young patients undergoing cataract surgery should be monitored routinely for glaucoma.

Słowa kluczowe: jaskra w oku bezsoczewkowym, operacja zaćmy, dzieci.
Key words: aphakic glaucoma, cataract surgery, children.

Despite technological advancements in pediatric cataract surgery, glaucoma is still one of the most common and most important complications. Several studies have reported the incidence and risk factors for glaucoma in patients with aphakic eyes (1-3). Reports indicate the risk factors such as a young age at cataract surgery, secondary membrane surgery, microcornea (4,5). The effect of IOL implantation on the incidence of secondary glaucoma after pediatric cataract surgery is also questionable (3). Several authors observed a lower incidence of glaucoma in these children (2,4,5).

The aim of the present investigation was to identify and report those eyes that have developed glaucoma after congenital cataract surgery with or without primary intraocular lens implantation.

Material and methods

A retrospective review was performed for 85 subjects (113 eyes, in patients that underwent pediatric cataract surgery with or without primary intraocular lens implantation between 1998 and 2002. Exclusion criteria were ocular trauma, congenital

glaucoma, uveitis and anterior segment dysgenesis. Each cataract surgery was performed by one surgeon (A.B-L). Standard limbal approach cataract extraction with IOL was performed in 101 eyes and lensectomy with anterior vitrectomy in 12 eyes. Peripheral iridectomy was made in all cases. Postoperative glaucoma was screened for by periodic examinations. IOP was measured with Pascal or Perkins applanation tonometry. For all subjects, the diagnosis of glaucoma required intraocular pressure ≥ 21 mm Hg and the optic nerve head to have a cup to disc ratio greater than 0.5 or an asymmetry between optic nerve heads greater than or equal to 0.2. All eyes with the diagnosis of glaucoma underwent gonioscopic examination. Children were treated, if the optic disc and/or visual field abnormalities corroborated the findings. Statistical analysis was performed with Student's test.

Results

We enrolled 85 children who had aspiration with IOL or lensectomy with anterior vitrectomy for congenital cataract (28 with bilateral cataracts and 57 with unilateral cataract), be-

tween 1998 and 2002. There were 48 boys and 37 girls. Median age of patients was 11.5 months (range 3 months-15 years). Postoperative glaucoma developed in 9.7% ($n = 11$) of eyes in children with cataract (Table I).

Type of glaucoma Typ jaskry	Pseudophakic eyes/ Oczy z pseudofakią ($n = 101$)	Aphakic eyes/ Oczy z afakią ($n = 12$)
Open-angle glaucoma/ Jaskra pierwotna otwartego kąta	6 (5.9%)	2 (18.2%)
Closed-angle glaucoma/ Jaskra zamykającego się kąta	0	3 (27.3%)

Tab. I. Type of postoperative glaucoma after cataract surgery.
Tab. I. Typ jaskry po operacji usunięcia zaćmy.

The median time to develop of postoperative glaucoma was 3.2 years (range 6 months-10 years). Mean after cataract surgery follow-up to the last examination including IOP measurement was 6.2 years (range 2-10 years). The mean follow-up period after the diagnosis of glaucoma was 3.8 years. 9 of 85 children (10.6%), had glaucoma (3/28 with bilateral cataract and 6/57 with unilateral cataract). None of the subjects with unilateral cataracts had developed glaucoma in the eye without cataract.

Table II shows distribution of postoperative glaucoma by type of cataract surgery.

	No of eyes/ Liczba oczu	Postoperative glaucoma/ Jaskra pooperacyjna
Lens aspiration with IOL/ Aspiracja zaćmy z WTK	101	5.9% (6/101)
Lensectomy with anterior vitrectomy/ Lensektomia z witrektomią przednią	12	41.7% (5/12)
P value		<0.0001

Tab. II. Distribution of postoperative glaucoma by type of cataract surgery.

Tab. II. Podział jaskry pooperacyjnej w zależności od typu operacji zaćmy.

Glaucoma developed in 41.7% of aphakic eyes undergoing lensectomy with anterior vitrectomy, compared with 5.9% eyes undergoing lens aspiration with IOL and it was significant difference ($P < 0.0001$). There was no significant difference between the prevalence of glaucoma in unilateral or bilateral cataract. The mean age at surgery of the patients having the eyes with glaucoma was 4.9 years. The mean IOP at the time of diagnosis of glaucoma was median 31 mm Hg (range: 25-48 mm Hg).

Three medications were used to control glaucoma: beta-blockers, carbonic anhydrase inhibitors and prostaglandin analogues. During the course of follow-up, all of 11 eyes required 1 to 3 medication changes for controlling glaucoma. 1 eye required 1 medication, 7 eyes required 2 medications for controlling intraocular pressure. 3 eyes (31.4%) of the 11 eyes,

required surgical intervention. 1 eye required 1 surgery (trabeculectomy with mitomycin C), and 2 eyes required 2 surgeries (trabeculectomy with mitomycin C and Ahmed valve implantation), to control intraocular pressure during the course of follow-up.

Discussion

The incidence of secondary glaucoma in children with aphakic eyes has been reported to be between 5% and 59% (1-6.7). These variability has been linked to differences in the patient population, the type of cataract, the age at surgical correction, the definition of glaucoma, and the length of follow-up. The diagnosis can be easily overlooked unless the examiner is specifically looking for it. Poor patient cooperation, posterior capsule opacification, nystagmus and pupil abnormalities are some of the factors that make glaucoma evaluation in pediatric patients difficult. The current study revealed an overall prevalence of aphakic glaucoma of 9.7%. This compares favorably with previous findings (8.9). The pathogenesis of this type of glaucoma remains unclear. It has been suggested that these eyes have congenital anterior segment abnormalities that make glaucoma more likely to develop. Perhaps the mechanism of aphakic glaucoma is related to angle barotraumas during surgery, resulting in a postoperative scarring response (10).

The effect of IOL on the incidence of glaucoma after cataract surgery is unclear. Asrani and coworkers reported a lower incidence (0.3%, or 1 in 377 cases) of open-angle glaucoma in eyes receiving a primary IOL implantation compared with remaining aphakic eyes (11.3%, or 14 in 124 cases), after cataract surgery (3). In the current studies, we noted that glaucoma developed postoperatively in 6 (5.9% of 101) pseudophakic eyes and 5 (41.7% of 12) aphakic eyes. Trivedi and coworkers found, that glaucoma developed in 3.8% of pseudophakic eyes and in 17.0% of aphakic eyes (1). Different methods of patient selection may help explain the difference in our results compared with the Asrani and Trivedi studies. Hiles reported, in his series of 225 pseudophakic eyes, that only 3 (1.3%) patients developed glaucoma (11). Yorston and associates noted, that glaucoma developed in 2 (1.7%) pseudophakic eyes in their series of 118 eyes (12). Like others, we found a significant association between type of cataract surgery and glaucoma (2.4.5).

Most reported studies on aphakic eyes suggest, that early age at surgery is a risk factor for glaucoma in aphakic eyes (1.13). We observed, that glaucoma developed in 5 (41.7% of 12) aphakic eyes. Watts and colleagues found glaucoma in 22% of their patients, but they were operated in the first 12 weeks of life (10). Trivedi and coworkers noted, that all eyes with glaucoma (both aphakic and pseudophakic), were in children who underwent cataract surgery before 4.5 months of age (1). In our study, the mean age of patients, who had lensectomy was 4 months compared with the mean age of patients with IOL implantation, which was 2.6 years. This is consistent with the results of Chak and associates, who found, that younger age at cataract was associated with development of glaucoma (7). Rabiah found, that apparent threshold age at cataract surgery for the development of later glaucoma appeared to exist at 9 months; patients operated on at or before this age frequently developed glaucoma, whereas patients operated on after this

age infrequently developed glaucoma (14). In his study, in 101 of the 118 glaucoma cases (86%), the cataract surgery was performed at or before 9 months of age.

In our studies in 12 eyes lensectomy was performed and glaucoma developed in 5 (41.7%) of them. Vishwanath and coworkers found, that 50% of the children in their series undergoing bilateral lensectomies during the first month of life developed glaucoma in 1 or both eyes after a 5 years follow-up, compared with only 15% of children undergoing cataract surgery after the first month of life (15). The authors have proposed to consider delaying cataract surgery until the infant is 4 weeks old. Despite that all our children had lensectomy after 3 months, the incidence of glaucoma among them was significantly high and further prospective studies are necessary.

In our series, the interval between age at cataract surgery and age at glaucoma diagnosis was 3.2 years. Asrani and associates reported, that glaucoma was diagnosed at a mean interval of 12.2 years after cataract surgery in their patients but noted that glaucoma could occur at any time from months to decades after cataract surgery (3). The wide range of onset of glaucoma varying from 6 months to 10 years in our study shows the importance of long-term follow-up of these patients. Most of our patients (8 eyes – 72.7%), had an open-angle glaucoma, which is in agreement with the previous reports, in which 75% to 93.9% of cases of aphakic glaucoma have been attributed to an open-angle glaucoma (3.5).

The management of the glaucoma varied among previous studies. Asrani and associates reported that 63.6% of the eyes achieved control of IOP with medications alone (3). This is consistent with our results. In 8 (72.7%) of glaucomatous eyes intraocular pressure is still controlled with topical medications. 3 eyes (31.4%) of the 11 eyes, required surgical intervention. Bholra and colleagues reported, that one third of the patients developing aphakic glaucoma were relatively well controlled using 1 to 2 medications during the course of follow-up, one third of patients required 3 medications for controlling intraocular pressure and the control of IOP was found to be difficult in the remaining one third and these patients required 4 or more medications or surgical intervention (5).

Conclusion

Despite modern surgical techniques the incidence of aphakic glaucoma must be considered in all patients after cataract extraction in children. Our results show the importance of careful follow up of intraocular pressure after cataract surgery in children. Young patients undergoing cataract surgery should be monitored routinely for glaucoma.

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