

Treatment results in aphakic patients with glaucoma following congenital cataract surgery

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Received: 17 May 2017 / Accepted: 24 November 2017 / Published online: 30 November 2017
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Abstract

Purpose To evaluate the clinical findings and possible risk factors of patients with aphakic glaucoma following congenital cataract surgery and identify the factors affecting response to glaucoma treatment.

Methods A retrospective chart review of 173 patients was performed who underwent congenital cataract surgery before the age of 12 months and 40 eyes of 25 patients with aphakic glaucoma were enrolled. Age of the patients at the time of the cataract surgery, postoperative complications, additional ocular pathologies and the type of glaucoma treatment needed were investigated.

Results Mean age of 25 patients at the time of cataract surgery was 3.31 ± 2.28 (range 1–11) months with a mean follow-up period of 79 ± 30.5 (32–176) months. Out of 40 eyes, medical therapy was effective in 20 (50%) eyes, whereas 20 (50%) eyes needed surgery for glaucoma. In these 20 eyes, 6 (30%) eyes underwent only 1, 4 (20%) eyes underwent 2 and 10 (50%) eyes underwent 3 or more procedures. Age at the time of cataract surgery, pupillary membrane

formation and additional ocular pathologies were not significantly associated both with the need for glaucoma surgery or the number of operations ($p \geq 0.05$). **Conclusion** Aphakic glaucoma following congenital cataract surgery is a serious complication which requires surgery in half (50%) of the patients. Usually, more than one surgical procedure (70%) is needed. It can be detected even years after cataract surgery (range 0.3–94 months), so long-term careful follow-up is necessary.

Keywords Aphakic glaucoma · Congenital cataract · Glaucoma surgery

Introduction

Aphakic glaucoma (AG) is one of the most important and common complications of congenital cataract surgery (CCS). The incidence of this glaucoma type ranges from 0.9 to 32% [1, 2]. Possible underlying mechanisms include chronic trabeculitis due to postoperative inflammation or chemical factors from the vitreous. AG may also be a component of a single syndrome, the mechanism that leads to cataract formation may also decrease the aqueous outflow from the trabecular meshwork, resulting in chronic open-angle glaucoma [3]. The incidence of early postoperative AG due to pupillary block is decreasing thanks to improved surgical techniques [4]. But

Meeting Presentation: 11th European Glaucoma Society (EGS) Congress, 7–11 June 2014, Nice (France).

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complete prevention of AG is not possible. Today, the most common postoperative glaucoma type after CCS is late onset open-angle glaucoma [5]. Management of AG is challenging. While medical treatment should be tried first to lower the intraocular pressure (IOP), surgical procedure is often required to control it [6].

There are many studies investigating the risk factors for glaucoma development following congenital cataract surgery such as age at the time of operation and IOL implantation [7]. However, there are very few studies about the risk factors affecting the results of glaucoma surgery in AG patients [8]. Since it is known that glaucoma surgery has a poor success rate in younger ages, having a perspective about these factors might help us choosing the best treatment option for each patient individually.

The purpose of this study was to evaluate clinical findings, possible risk factors and the medical and surgical treatment results of paediatric AG patients and determine the factors affecting response to glaucoma treatment.

Materials and methods

We retrospectively reviewed the medical charts of all 284 aphakic eyes of 173 consecutive congenital cataract patients that underwent standard lensectomy and anterior vitrectomy operation before the age of 12 months and followed up for at least 24 months regularly. Forty eyes of 25 patients with aphakic glaucoma were enrolled in the study. The cases with glaucoma diagnosis prior to lensectomy or with independent risk factors for the development of glaucoma such as anterior segment dysgenesis or severe microphthalmia and the patients with previous laser treatment and/or ocular surgery apart from cataract extraction were excluded. Demographic features, clinical course and characteristics, complications and visual outcomes were noted. Lensectomy-related information such as age at lensectomy, surgical technique, surgeon, intraoperative and postoperative complications and postoperative medications were also collected. All patients underwent an overall ophthalmic examination, including slit-lamp biomicroscopy, IOP measurement, gonioscopy with Swan-Jacob lens and fundus examination through a dilated pupil.

Measurement of best-corrected visual acuity (BCVA) was performed in all cooperative children. Diagnosis of aphakic glaucoma was mainly based on IOP greater than 25 mmHg or a lower pressure associated with one or more of the following findings in the absence of other causes of glaucoma: corneal oedema/enlargement, progressive optic disc cupping defined as an increase of ≥ 0.2 in the cup-to-disc ratio, asymmetric progressive myopic shift outside the normal limits with the presence of enlargement of the corneal diameter and/or axial length [5, 9–11]. IOP was measured by Tono-Pen AVIA[®] (Reichert Inc, USA) or a Perkins tonometer (Haag-Streit, Bern, Switzerland); corneal diameter was measured by caliper; and CCT was measured using iPac[®]-pachymeter (Reichert Inc, USA) under inhalation anaesthesia with sevofluran. In our study, all IOP measurements were obtained in first 2 min of anaesthesia and this excludes the possibility of false low results [12, 13]. Anti-glaucomatous treatment modalities and the treatment responses were evaluated. The following parameters were also investigated: age at the time of cataract surgery, visual outcome, post-treatment IOP, postoperative complications, optic disc abnormalities, number of re-operations, presence of systemic and ocular anomalies.

Initial treatment was prescribing anti-glaucoma medications in all of the eyes with AG. The eyes with progressive buphthalmos or glaucomatous optic neuropathy coupled with uncontrolled IOP despite the use of maximum anti-glaucoma medications underwent glaucoma surgery. Trabeculectomy was the first applied procedure in all eyes [14]. Success was defined as if IOP is less than 21 mmHg (complete success without any anti-glaucoma medications and qualified success with anti-glaucoma medications) and if stable corneal diameter was maintained with no further optic disc cupping in the absence of any devastating complication throughout the follow-up period [15, 16].

The criteria for re-operation were progressive myopic shift and/or increase in corneal diameter despite of maximum anti-glaucomatous treatment, progressive increase in cup/disc ratio of optic disc and increase in IOP [17].

Control visits were scheduled as every 3–4 months, and all parameters were evaluated in each visit. Drainage device implantation (Ahmed glaucoma valve) and cyclodestructive surgeries were second-

and third-order surgeries, respectively. Congenital cataract surgeries were performed by two of the authors (OU and SK), and glaucoma surgeries were performed by one of the authors (HA). The surgical methods were similar in all cases.

Data collection for this study has been approved by University Local Research Ethics Committee. The study protocol adhered to the Declaration of Helsinki for research involving human participants.

Statistical analysis was performed with SPSS for Windows Version 15.0 (SPSS Inc., Chicago, IL, USA). All data were reported as averages \pm standard deviations (SD). Chi-square, *t* test and Pearson correlation test were used. *p* value of 0.05 or less was considered as statistically significant.

Results

Out of 284 aphakic eyes, 40 (14%) eyes of 25 patients (15 male, 10 female) were diagnosed as AG. The mean age at the time of cataract extraction was 3.31 ± 2.28 (range 1–11) months, and the mean follow-up period was 79 ± 30.5 (32–176) months. Cataract surgery was performed by one of the authors. The operative technique was same in all cases including corneal incision, anterior capsulorrhexis, hydrodissection, aspiration of lens material and posterior capsulorrhexis together with anterior vitrectomy. No surgical or postoperative complications occurred in any of the eyes. After lensectomy, eyes were treated with corticosteroids, antibiotics and cycloplegics for 1–2 months postoperatively. There were no known cases of corneal decompensation or endophthalmitis. Fifteen (60%) patients had bilateral lensectomy and developed aphakic glaucoma in both eyes. Seven (28%) patients had unilateral lensectomy and developed aphakic glaucoma in only that operated eye. Three (12%) patients had bilateral lensectomy and developed aphakic glaucoma in only one eye at last follow-up. Mean interval between cataract surgery and development of glaucoma was 8.4 ± 23.1 (range 0.3–94) months. Accompanying ocular malformations were detected in 6 (15%) eyes which were microcornea in 5 eyes and persistent foetal vasculature (PFV) in 1 eye. As systemic diseases, 1 patient had Down's syndrome, 1 patient had respiratory distress due to prematurity without accompanying retinopathy of prematurity and 1 patient had thalassaemia major.

All of 3 patients with systemic diseases underwent unilateral cataract surgery. Secondary intraocular lens (IOL) implantation was not performed in any of the eyes during the follow-up period. Demographic data and clinical characteristics of patients and the postoperative complications after congenital cataract surgery are outlined in Table 1.

Pupillary membrane formation was observed in 19 (47.5%) eyes, and mean duration of time between cataract surgery and membrane formation was 95 days (range 10–180). Topical steroids were used as initial treatment in all eyes, and the membrane was resolved in 7 (36.8%) eyes. The remaining 12 eyes, in which the membrane was not resolved with medical treatment (63.2%), underwent membranectomy. Additional peripheral iridotomy was also performed in one of them, and glaucoma surgery was required in 5 cases due to unresponsive topical anti-glaucomatous therapy.

Closed iridocorneal angle was detected in 4 (10%) eyes, and open iridocorneal angle was observed in 36 (90%) eyes. Medical treatment was effective by reducing increased IOP to normal levels and preventing glaucomatous changes in 20 (50%) eyes. On the other hand, due to progressive buphthalmos or glaucomatous optic neuropathy accompanying uncontrolled IOP, 20 (50%) eyes subsequently underwent glaucoma surgery. Number of glaucoma medications prescribed for the patients treated with only anti-glaucoma drops and number of glaucoma surgeries performed in patients who needed glaucoma surgery in addition to medical treatment are summarized in Table 2. In all the eyes with additional ocular pathologies, medical treatment was effective and none of them required glaucoma surgery. Except one eye (5%) among the eyes that needed glaucoma surgery, all eyes subsequently required additional medical therapy during the follow-up period.

In patients with medical treatment, dorzolamide–timolol combination was the most frequently used medication and prostaglandin analogues were the second medical treatment choice. Mean preoperative IOP of medically treated eyes was 25.1 ± 1.22 , and mean postoperative IOP was 16.8 ± 3.2 mmHg ($p = 0.02$, paired sample *t* test). In patients who needed glaucoma surgery, the most frequently and initially applied procedure was trabeculectomy (all 20 eyes had trabeculectomy at least once). Mitomycin C (MMC) (0.2 mg/ml for 4 min) was used in all

Table 1 Demographic data and clinical characteristics of patients at the time of glaucoma diagnosis

Characteristics (40 eyes of 25 patients)	
Sex, number of patients (%)	
Female	10 (40%)
Male	15(60%)
Age at cataract surgery, months	
Mean \pm SD (range)	3.31 \pm 2.28 (1–11)
Interval between cataract surgery and glaucoma diagnosis, months	
Mean \pm SD (range)	8.4 \pm 23.1 (0.3–94)
Laterality of glaucoma, number of patients (%)	
Unilateral	10 (40%)
Bilateral	15 (60%)
Coexisting systemic disease, number of patients (%)	
Down syndrome	1 (4%)
Respiratory distress (prematurity)	1 (4%)
Thalassaemia major	1 (4%)
Coexisting ocular pathology, number of eyes (%)	
Microcornea	5 (12.5%)
Persistent foetal vasculature	1 (2.5%)
Complications after congenital cataract surgery, number of eyes (%)	
Pupillary membrane	19 (47.5%)
Residual lens material	4 (10%)
Pupillary block	4 (10%)
Posterior synechiae	6 (15%)
IOP	
Mean \pm SD (mmHg)	29.8 \pm 14.8
Corneal diameter	
Mean \pm SD (mm)	10.5 \pm 1.06

Table 2 Treatment features of aphakic glaucoma eyes

Only medical treatment (20 eyes)		Glaucoma surgery (20 eyes)	
Medications, <i>n</i> (%)	Eyes, <i>n</i> (%)	Surgeries <i>n</i> (%)	Eyes, <i>n</i> (%)
1 Drug	15 (75)	1 Operation	6 (30)
2 Drugs	4 (20)	2 Operations	4 (20)
3 Drugs	1 (5)	\geq 3 Operations	10 (50)

trabeculectomy procedures. Drainage device implantation (Ahmed glaucoma valve; 6 eyes) and cyclodestructive surgeries (9 eyes) were performed as second- and third-step procedures.

The mean IOP of all study eyes decreased significantly from 29.8 \pm 14.8 mmHg (23–46 mmHg) to 17.3 \pm 2.1 mmHg (12–30 mmHg) after glaucoma treatment over a mean follow-up time of 79 (range 32–176) months ($p = 0.01$, paired sample *t* test). There was no statistically significant difference in

corneal diameter between pre- and post-glaucoma treatment (10.5 \pm 1.06 mm and 11.3 \pm 0.3 mm, respectively) ($p = 0.08$, paired sample *t* test). The mean cup/disc ratio at the time of glaucoma diagnosis was 0.4 \pm 0.3, whereas the mean postoperative cup/disc ratio was 0.6 \pm 0.3. Pale optic discs were observed in 9 eyes. Pre-treatment CCT measurements could not be obtained from the all patients, but the mean CCT measurements were noted as 626.0 \pm 48.4 μ m at the last follow-up visit. Visual

acuity (in Snellen chart) was evaluated overall in 25 eyes of 14 children that were able to cooperate, and the mean final BCVA was 0.28 ± 0.16 ($20/70 \pm 20/125$).

Complications seen after glaucoma surgery are listed in Table 3. Devastating complications such as retinal detachment and endophthalmitis were not observed in any of the cases. Choroidal detachment in one eye was treated successfully with systemic corticosteroids. Eyes with shallow anterior chamber ($n = 2$; 10%) and hypotony ($n = 2$; 10%) were covered with medical treatment (topical steroids) in 3 weeks and did not require any surgery. In one eye with implant exposure, revision surgery was performed with conjunctival flap.

Age at the time of cataract surgery, pupillary membrane formation and additional ocular pathologies were not found to be significantly associated with the need for glaucoma surgery (respectively $r = 0.25$, $p = 0.9$ and $p = 5.1$; Pearson's correlation analysis and Chi-square test) or the number of operations (respectively $r = -0.17$, $p = 0.4$ and $p = 4.0$; Pearson's correlation analysis Chi-square test) (Table 4).

Discussion

Aphakic glaucoma is one of the major complications of congenital cataract surgery. Treatment success rates are not satisfying, and there is still lack of adequate information, especially about the factors effecting the treatment results. In this study, our aim was to evaluate the factors that might have an affect on response to treatment and also prognosis.

In our study, the rate of AG was 14% with a mean follow-up period of 79 months. Similar results were reported by Mills et al. [2] as 14.4% with a mean follow-up time of 5.8 years; Keech et al. [9] as 12.5% with a mean follow-up time of 3.7 years; and Magnusson et al. [7], as 12% with a mean follow-up time of

9.2 years. The incidence of acute postoperative angle closure glaucoma was decreased with the modern surgical techniques in congenital cataract surgery; however, the ratio of AG remains almost the same as reported in the literature [4].

Most common type of the glaucoma in our study was observed as open-angle glaucoma in 90% of the eyes in concordance with the findings of the Infant Aphakia Treatment Study (IATS) that was reported the open-angle glaucoma rate as 95% [5]. Some ocular anomalies such as PFV and microcornea are shown to have a relationship with development of AG in the previous studies [2], but according to our study results, they did not effect the treatment response negatively. The eyes with ocular pathologies (5 eyes with microcornea and 1 eye with PFV) in our study were all responded to medical treatment with topical anti-glaucomatous drops and none of them needed surgery. The low number of cases with such anomalies in our study might be the reason why there were no negative impact observed. In IATS reports, PFV also did not influence the risk of developing glaucoma or glaucoma suspect, but having a corneal diameter of 10 mm or less seemed to increase the risk of diagnosing as glaucoma or glaucoma suspect [5]. Nevertheless, our finding suggested us not to be pessimistic about AG treatment in those eyes (Table 5).

Young age at the time of cataract surgery, as another possible risk factor, was also reported to be responsible for AG development in the literature [2, 7] as it was in our study. Out of 40 eyes, 36 (90%) eyes were operated in the first 6 months and 26 (65%) eyes were operated in the first 3 months of life. However, age at the time of cataract surgery was not found to be a negative prognostic factor for treatment of AG and not significantly associated both with the need for glaucoma surgery or the number of operations. Khan et al. reported 2 peak incidences of relative risk for later aphakic glaucoma as a function of age at the time of cataract surgery, one within the first month of life and the second at 5–6 months of life, but these intervals did not correlate with postsurgical complications that required re-operation [18].

Pupillary membrane formation was observed in 19 (47.5%) eyes in our study and 12 (63.2%) of them needed membranectomy as treatment. In the study of Zetterberg et al. [8], 3 eyes (13%) out of 23 AG eyes needed surgery for pupillary membrane. The higher rate in our study might be the result of younger age

Table 3 Complications following glaucoma surgery

Complications	Eyes, <i>n</i> (%)
Shallow anterior chamber	2 (10)
Hypotony	2 (10)
Bullous keratopathy	1 (5)
Choroidal detachment	1 (5)
Implant exposure	1 (5)

Table 4 Statistical relations between glaucoma treatment and clinical features

	Age at cataract surgery (<i>r</i> value)	Pupillary membrane formation (<i>p</i> value)	Additional ocular pathologies (<i>p</i> value)
Need for glaucoma surgery	0.25*	0.9**	5.170**
Number of glaucoma surgeries	− 0.176*	0.4**	4.0**

*Pearson correlation analysis

**Chi-square test

(mean; 3.31 ± 2.28 months) at the time of cataract surgery and maybe due to the presence of more inflammation. On the other hand, pupillary membrane formation was not found to be statistically related with anti-glaucoma treatment response or number of glaucoma surgeries.

Mean duration of time between congenital cataract surgery and development of AG was 8.4 ± 23.1 (range 0.3–94) months. Magnusson et al. [7] reported onset of glaucoma as a median of 6.2 months (187 days) following cataract surgery. Zetterberg et al. [8] reported the interval between congenital cataract surgery and AG diagnosis as a mean of 9.5 months. The mean duration between cataract removal and diagnosis of glaucoma was reported as much as 7 years in another study [19]. In IATS, it was proposed that the risk of glaucoma was 17% and the risk for developing glaucoma or glaucoma suspect was 31% at 4.8 years following cataract surgery which was performed between 1 and 6 months of life [5]. All these findings were suggested that AG can occur at any age and long-term follow-up is important.

Among the eyes that were treated with anti-glaucoma medications only, 15(75%) eyes needed only 1 medication, 4 eyes (20%) needed 2 medications and 1(5%) eye needed 3 medications. Bhola et al. [19] reported that 20 eyes (36%) required 2 or less medications, 18 eyes (33%) required maximum 3 medications and 17 eyes (31%) required 4 or more medications for more than 6 months.

In our study, among the eyes that required surgery, 30% required only 1; 20% needed 2 and 50% needed 3 or more operations. Similarly, Zetterberg et al. [8], reported their ratios as 35% needed 1, 35% of eyes required 2 and 30% of eyes needed more than 2 procedures. Bhola et al. reported as 27% of all study eyes needed 1 or more surgery. In their study, among

the surgically treated eyes, 40% required only 1 surgical procedure, 47% required 2–3 operations and 13% required more than 4 procedures [19].

Trabeculectomy with MMC was the first line of treatment in surgical management of AG. However, it is known that trabeculectomy is not very successful in younger ages, because of increased fibrotic activity and rapid wound healing response [20]. In our study, trabeculectomy with MMC alone was successful in 6 eyes that did not require drainage device implantation or cyclodestructive surgery. Among these eyes, only 1 eye had a stable IOP under 21 mmHg without any anti-glaucoma medication and with no glaucomatous optic disc changes (complete success). Azuaro et al. [12] also reported the probability of having IOP 21 mmHg as 0% without any anti-glaucoma medication and with clinically stable glaucoma 1 year after surgery in the 8 (57%) aphakic eyes in their study. Both these findings suggested that glaucoma following congenital cataract surgery is mostly refractory to filtering surgery even with the intraoperative use of MMC.

There are few studies that reported higher success rates with glaucoma drainage devices for refractory glaucoma in paediatric population. Molteno et al. [21] and Billson et al. [22] reported success rates of 87 and 95%, respectively. Contraindicatory reports also have been published. Coleman et al. [23] reported cumulative probability of success 60% at 24 months, while Neshet et al. [24] reported a success rate of 59%. The success rates of glaucoma drainage devices in paediatric glaucoma are variable, and there is an absence of prospective randomized clinical trials comparing these devices with trabeculectomy. Considering the complications of drainage device implantation, especially the negative impact on cornea, we prefer trabeculectomy as first-line surgical treatment. We

Table 5 Summary

Patient no.	Eye	Age during cataract surgery	Ocular anomalies	Complications of cataract surgery (treatment)	Glaucoma treatment modality	Complications of glaucoma surgery	Final BCVA
1	R	1.5	None	Residual lens material	Surgical (2 operations)	–	NA
	L	1.5	None	None	Medical (1 drug)	–	NA
2	R	2	None	Pupillary membrane (surgical)	Medical (1 drug)	–	0.2
	L	2	None	Pupillary membrane (surgical), posterior synechiae	Medical (1 drug)	–	0.2
3	L	7	None	None	Medical (3 drugs)	–	0.2
4	R	4	None	None	Medical (1 drug)	–	0.4
	L	4	None	Pupillary membrane (surgical), pupillary block	Surgical (1 operation)	–	0.3
5	R	4	None	Pupillary membrane (medical), pupillary block	Medical (2 drugs)	–	0.05
	L	4	None	None	Medical (2 drugs)	–	0.3
6	R	4	None	None	Surgical (3 operations)	–	0.3
	L	4	None	Pupillary membrane (medical), pupillary block	Surgical (3 operations)	–	0.3
7	R	2	None	None	Surgical (6 operations)	Implant exposure	0.1
	L	2	None	Residual lens material	Surgical (6 operations)	–	0.1
8	L	5	None	Pupillary membrane (surgical)	Surgical (1 operation)	–	0.6
9	R	1.5	None	Pupillary membrane (medical)	Surgical (2 operations)	Shallow anterior chamber	NA
10	R	3	None	None	Medical (1 drug)		0.3
	L	3	None	Posterior synechiae	Medical (1 drug)		0.4
11	R	1.5	None	None	Surgical (3 operations)	Bullous keratopathy	0.05
	L	1.5	None	Pupillary membrane (medical)	Surgical (3 operations)	Hypotony	0.05
12	R	4	None	Pupillary membrane (medical), pupillary block	Surgical (2 operations)	Choroidal detachment	NA
	L	4	None	Pupillary membrane (medical)	Surgical (3 operations)		NA
13	L	3	None	Pupillary membrane (surgical)	Medical (1 drug)		0.4
14	R	3	Microcornea	None	Medical (1 drug)		NA
	L	3	Microcornea	Pupillary membrane (surgical)	Medical (1 drug)		NA
15	R	3	Microcornea	Pupillary membrane (surgical)	Medical (1 drug)		NA
	L	3	Microcornea	Pupillary membrane (surgical)	Medical (1 drug)		NA

Table 5 continued

Patient no.	Eye	Age during cataract surgery	Ocular anomalies	Complications of cataract surgery (treatment)	Glaucoma treatment modality	Complications of glaucoma surgery	Final BCVA
16	R	1	None	Pupillary membrane (surgical)	Surgical (1 operation)		NA
	L	1	None	Pupillary membrane (medical), posterior synechiae	Medical (1 drug)		0.6
17	R	3	None	None	Medical (1 drug)		0.5
	L	3	None	Pupillary membrane (surgical)	Medical (1 drug)		0.5
18	R	1	None	Pupillary membrane (surgical)	Surgical (4 operations)		NA
	L	1	None	None	Surgical (3 operations)		NA
19	R	4	None	None	Surgical (1 operation)		0.3
20	L	7	None	Pupillary membrane (surgical), posterior synechiae	Surgical (2 operations)		NA
21	L	3	None	None	Surgical (8 operations)	Shallow ant. chamber, hypotony	NA
22	R	2	PFV	Residual lens material	Medical (1 drug)		NA
23	L	11	Microcornea	Posterior synechiae	Medical (2 drugs)		NA
24	R	1	None	None	Surgical (1 operation)		0.2
	L	1		None	Surgical (1 operation)		0.2
25	L	11	None	Residual lens material, posterior synechiae	Medical (2 drugs)		NA

use drainage device implantation (Ahmed valve) in 6 eyes as secondary procedure and observe tube erosion (exposure) as complication in 1 (16.6%) eye.

As for the angle surgeries in AG, Bothun et al. reported a 57% success rate with angle surgeries (trabeculotomy 180° and/or goniotomy 180°) in their study of 14 eyes. The mean number of surgeries in that study was 1.3. Success was defined as an IOP of ≤ 24 mmHg with or without topical medication, a lack of sight treating complication and avoidance of trabeculectomy or tube shunt, and treatment success rate after 1 surgery was 42.9% (all eyes had trabeculotomy) [25].

AG is a challenging condition that mostly requires surgery and multiple procedures might be needed. But despite of high surgery rates, the final best-corrected

visual acuity was ≥ 0.3 in 13 (32.5%) eyes and ≥ 0.1 in 20 (50%) eyes in our study. In Bhola et al.'s study, the final BCVA was reported as $\geq 20/40$. The final BCVA was no light perception in 1 (2.5%) eye and hand motions in other 1 (2.5%) eye. In 15 (37.5%) eyes, BCVA measurements could not be detected because of poor cooperation or pre-verbal ages. These findings showed that the results could be worth the effort and we should not give up on these children.

Limitations of this study were its retrospective design and relatively small number of patients.

In conclusion, the management of glaucoma following congenital cataract surgery is challenging. Risk factors for development of glaucoma are better known than the factors that might affect the response to treatment. More studies are needed to understand

these factors and have an opinion about the response to treatment at the beginning.

Compliance with ethical standards

Conflict of interest All authors declare that there is no conflict of interest.

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