

Clinical Features and Outcomes of Congenital Cataract Surgery with Primary Intraocular Lens Implantation in a Tunisian Cohort

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Abstract

Purpose: To describe the clinical features of congenital cataract (CC) in a Tunisian cohort and to assess the surgical outcomes of primary intraocular lens implantation in two groups based on the age at surgery.

Methods: This study was a prospective analysis of children under 5 years with CC that were operated between January 2015 and 2020. The surgery consisted of phacoaspiration with posterior capsulorhexis and primary implantation. Group 1 comprised children operated at <2 years of age and Group 2 comprised children operated between 2 and 5 years. Peri and postoperative surgical events as well as refractive and visual outcomes were compared between both the groups.

Results: Fifty-five (84 eyes) infants were enrolled. Group 1 included 30 (48 eyes) children and Group 2 included 25 (36 eyes) patients. The mean follow-up was 27.60 ± 19.89 months. The mean delay between the diagnosis and the cataract surgery was 11.97 ± 13.84 months. Of 14 (16.7%) eyes with postoperative visual axis opacification (VAO), 9 (10.7%) eyes required pars plana membranectomy. The VAO was not statistically associated with the age at surgery ($P = 0.112$), but significantly correlated with sulcus implantation ($P = 0.037$). The final mean visual acuity was 0.51 logMAR and comparable between both the groups ($P = 0.871$). Poor visual outcome was significantly associated with low age at presentation (<6 months; $P = 0.039$), delay between the diagnosis and time of surgery ($P = 0.001$), preoperative nystagmus ($P = 0.02$), and poor parental compliance to amblyopia treatment ($P = 0.009$).

Conclusions: Primary implantation seems to be safe and efficient. VAO appears to become an avoidable occurrence owing to better surgical techniques. Amblyopia remains the biggest barrier to final visual outcome.

Keywords: Congenital cataract, Intraocular lens implantation, Visual acuity, Visual axis opacification

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INTRODUCTION

Congenital cataract (CC) is the primary cause of avoidable childhood blindness worldwide.¹ It is a severe disease which alters the quality of sensory input, leading to irreversible visual defects.^{2,3} Due to its huge impact on individuals' life and society, it was considered one of the main priorities of Vision 2020: "The Right to Sight", the global initiative to reduce the world's burden of avoidable blindness.²

CC is responsible for 5%–25% of childhood blindness worldwide.^{2,4} In developed countries, it is responsible for 3%–12% of severe childhood visual impairment.⁴ In Tunisia (North Africa), 18.8% of childhood blindness is due to CC.⁵

Despite excellent progress in surgical techniques and intraocular lenses (IOLs) biocompatibility, CC treatment remains a challenging disease.⁶ Currently, pediatric ophthalmologists agree that primary IOL implantation is valid and safe for

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children above the age of 2 years. However, the benefits and risks of primary implantation in infants younger than 2 years remain controversial.⁷⁻¹⁵

Owing to economic and social limits, “the one-step solution” based on cataract extraction and primary implantation, regardless of the age of the child, seems to be the most practical option in many countries. Furthermore, this practice has proven to be safe and effective in several studies.⁷⁻¹⁰

Therefore, we conducted this study to describe the demographic features of CC in a North African pediatric population. We also aimed to assess the surgical and visual outcomes of primary IOL implantation in CC in children younger than 2 years versus those between 2 and 5 years.

METHODS

A prospective study was conducted at the Department of Ophthalmology, Hedi Rais Institute of Tunis, Tunisia. Eligible patients were recruited between January 2015 and January 2020. Written informed consent was obtained from the parents, and the study was approved by the ethics committee of our institution.

The study included patients with CC aged <5 years who underwent primary IOL implantation. We excluded patients with non-CC (traumatic, subluxated, or complicated cataract) and associated congenital ocular abnormalities such as glaucoma, microcornea (corneal diameter <9.5 mm), aniridia, microphthalmia (axial length <16 mm), or severe persistent fetal vasculature. In bilateral CC, when the time between both eye surgeries exceeded 4 weeks, the fellow eye was excluded from the study. We also excluded patients with a short follow-up of <1 year. All surgeries were performed by a single surgeon.

Children were divided into two groups based on the age at surgery: Group 1, children with CC operated at <2 years of age and Group 2, children with CC operated between the ages of 2 and 5 years.

Detailed demographic data were elicited, including family history of CC, parental consanguinity, geographic origin, course of pregnancy, neonatal history, presenting complaints, and delay between presentation and surgery.

All patients underwent a complete preoperative ocular evaluation and whenever necessary, examination under anesthesia (EUA). EUA was practiced under sevoflurane, using spontaneous ventilation. Pupils were dilated with tropicamide 0.5% and phenylephrine 2.5%, and anatomical location of lens opacities was noted. Fundus examination was done using direct ophthalmoscopy. When funduscopy was precluded, ultrasound B-scan was performed to rule out any intraocular pathology. Visual evoked potentials and electroretinogram were carried out if necessary. All children were referred for a routine pediatric examination.

Patients with bilateral cataracts underwent delayed sequential bilateral cataract surgeries. The eye with a denser cataract was

operated upon first; second, eye surgery was scheduled within 2–4 weeks.

Written informed consent was obtained from the parents after thoroughly explaining the benefits and risks of the surgical procedure.

Keratometry was measured using a Nidek Handheld Ref/keratometer and axial length was measured with immersion ultrasound A-scan (Ocuscan, Alcon Laboratories, USA). IOL power was calculated based on SRK-II formula. IOL power required for emmetropia was undercorrected depending on the age at operation [Table 1].¹⁵

Under general anesthesia, a limbal incision was made using a 2.2 mm keratome knife at 10 o'clock and a side-port tunnel was made at 2 o'clock with a 15° paracentesis knife. Trypan blue was injected to aid visualization of the anterior capsule and to decrease its elasticity. Anterior chamber was filled by a dispersive ophthalmic viscosurgical device (OVD), Viscoat (Alcon DUOVISC). An anterior continuous curvilinear capsulorhexis of 5.0 mm diameter was performed using Utrata forceps. We aspirated the lens using bimanual irrigation/aspiration (ALCON Infiniti Phacoemulsifier). A manual posterior capsulorhexis of approximately 4.0 mm using an Utrata forceps was followed by an anterior vitrectomy by the anterior route. Afterward, in-the-bag IOL implantation of a single-piece hydrophobic acrylic IOL Acrysof SA60AT (Alcon Laboratories, USA) was attempted using cohesive OVD Provisc (Alcon DUOVISC). Sulcus implantation without anterior capsulorhexis capture, using a three-piece IOL, was performed when posterior capsular support was insufficient due to a very large posterior capsulorhexis or to the presence of a posterior capsular defect. Both the main and the side-port incisions were sutured with 10-0 nylon. At the end of the surgery, intracameral cefuroxime and subconjunctival dexamethasone injection were performed.

A standardized postoperative care regimen was followed including dexamethasone eye drops 6 times a day for the 1st week, followed by a slow taper over the next 4 weeks; topical gentamycin and tropicamide were given 4 times a day for 2 weeks.

All patients were examined at the 1st, 5th, and the 15th day to observe for immediate postoperative complications. Sutures were removed at the 1-month follow-up. EUA in young infants was performed at the 1st, 3rd, and 6th month and then each 6 months until the patient became old enough to be examined by a slit-lamp.

Amblyopia therapy was immediately initiated. Spectacles were prescribed based on proper refractive correction with supplementary addition in bilateral cases up to 2 years, after which bifocal spectacles were prescribed. We emphasized the importance of wearing glasses and patching.

Best-corrected visual acuity (VA) was measured in cooperative children. VA was converted to the logMAR for statistical analysis.

Table 1: Intraocular lens power undercorrection and postoperative refractive error target according to the age at surgery

	0-3 months	3-6 months	6-12 months	12-18 months	18-24 months	24-36 months	36-48 months	48-60 months
IOL power undercorrection (%)	40	35	30	25	20	15	10	5
Postoperative refractive error target (Diopter)	+4.00	+4.00	+3.00	+2.00	+2.00	+1.00	+1.00	+1.00

IOL: Intraocular lens

Children with significant visual axis opacification (VAO) underwent additional surgical membranectomy through the pars plana route.

Statistical analysis

Statistical analysis was done using SPSS version 18.0.0 software (SPSS Inc., Chicago, Illinois, USA). Sample sizes equal to or <30 were considered normally distributed. Hence, the statistical significance of quantitative variables was determined by independent *t*-test. Statistical significance of categorical variables between two groups was compared using χ^2 test/Fisher's exact test.

In cases with bilateral CC, we included two eyes data from one person, which may lead to unknown correlation between visual outcomes. Therefore, we performed the generalized estimating equation (GEE) allowing the use of data from both eyes when accounting for the correlation between the two eyes in a single subject. Binary logistic regression was performed to assess factors associated with final visual outcome. The level of statistical significance was taken as $P < 0.05$.

RESULTS

Our study included 84 eyes of 55 patients who underwent CC surgery. Follow-up was prospective, averaging 27.60 ± 19.89 months (range, 12 to 65 months).

Consanguineous marriage between the parents was elicited in 23 (41.8%) patients. Seven (12.7%) patients had a family history of CC. Of our patients, 29 (52.7%) came from the northwest of the country. The age at presentation ranged from 3 weeks to 60 months with a mean age of 16.85 ± 7.92 months. There were 35 (63.6%) male children and 20 (36.3%) females, defining the sex ratio at 1.75. The cataract was bilateral in 34 (61.8%) patients. In five bilateral cases, the time between both eyes' surgeries exceeded 4 weeks due to a delay in presentation. The second eye was excluded from the study.

Leukocoria was the main presenting complaint in 39 (70.9%) patients, followed by strabismus in 8 (14.5%) patients, poor eye tracking in 5 (9.1%) patients, and nystagmus in 3 (5.4%) patients.

Nine (16.36%) children had systemic associations. The most common diagnosis was psychomotor retardation. One (1.8%) patient had a positive titer for rubella.

Mature white cataract was the most common type, observed in 61 eyes of 36 (72.6%) patients. Preoperative examination

showed nystagmus in 14 (25.4%) patients and strabismus in 18 (32.7%) patients.

At surgery, 30 (48 eyes, 54.5%) children were younger than 2 years (Group 1), and 25 (36 eyes, 45.4%) children were 2 years and older (Group 2). The mean age at surgery was 11.71 ± 8.63 months (3–24 months) in Group 1 and 40.19 ± 9.2 months (25–60 months) in Group 2. No child was operated within 3 months of age, and 8 (14.5%) were operated between 3 and 6 months.

The mean time between diagnosis and surgical treatment of the cataract was 11.97 ± 13.84 months (range, 1 to 55 months). Thirty-two (58.2%) children had a delay of 6 months or more. The causes of this delay were the inability to reach the hospital in 12 (37.5%) infants, the unaffordable cost of the surgery in 9 (28.1%) cases, and the feeling of unneeded surgery in 5 (15.6%) cases. The cause was unknown in 6 (18.8%) infants.

The demographic and clinical characteristics of our population are listed in Tables 2 and 3. Table 4 shows the biometric profile at presentation.

Pupils were undilated in 17 (20.2%) eyes which required iris retractors. There were 13 (15.5%) intraoperative events. The anterior capsulorhexis extended peripherally in one eye. Seventy (83.3%) eyes had in-the-bag IOL implantation, while 14 (16.7%) eyes had the sulcus implantation without a significant difference regarding the age at surgery (18.7% in Group 1 and 13.9% in Group 2, $P = 0.12$).

A too large posterior capsulorhexis occurred in ten eyes. A posterior lenticonus was found in six eyes, three of them were implanted in the sulcus. An anterior persistent fetal vasculature was discovered intraoperatively in one unilateral case, which was implanted in the sulcus.

Inflammatory reaction with pupillary membrane formation was the most common early postoperative complication, noted in 18 (21.4%) eyes, ten of which were from Group 1. We noticed no significant difference regarding postoperative inflammation between the two groups ($P = 0.432$). Inflammatory reaction was not associated with sulcus implantation ($P = 0.244$); however, it was significantly correlated with iris retractors' use ($P = 0.031$). Postoperative inflammation cleared completely with topical, subconjunctival, and oral corticosteroids in all eyes. Residual partial posterior synechiae were seen in one eye of a 1-year-old patient. No cases of pupillary block glaucoma or endophthalmitis were recorded. A mild IOL decentration was noted in two eyes implanted in the sulcus and did not require surgical repositioning. No cases of pupil IOL capture were observed.

VAO due to lens epithelial cells proliferation occurred in 14 (16.7%) eyes, among them nine (10.7%) eyes required an additional pars plana membranectomy. The median time from primary surgery to reoperation was 11.5 months (range, 2–79 months). The VAO was not affected by the age at surgery ($P = 0.112$), but was associated with sulcus implantation ($P = 0.037$). Clearing the VAO was the only reason for additional surgery in our case series.

Finally, there was no significant difference in terms of intraoperative or postoperative complications between the two groups as shown in Table 5.

Secondary glaucoma, retinal detachment, or cystoid macular edema has not been observed at the last follow-up examination in any patient.

The mean postoperative hyperopia at 1 month and the myopic shift at 2 years from surgery are detailed in Table 6.

At the last follow-up examination, VA could be assessed only in 40 (47.6%) eyes, due to young age (9 patients), psychomotor retardation (7 patients), and lack of cooperation (7 patients). The mean VA was 0.51 logMAR. The maximum of corrected VA was 0 logMAR, and the

worst corrected VA was 1.5 logMAR. The VA was >0.5 logMAR in 18 (45%) eyes.

The mean VA was 0.5 logMAR in Group 1 and 0.53 logMAR in Group 2 ($P = 0.871$).

We stratified our study population regarding the age at presentation upon a 6-month split point. Final mean VA was 0.63 logMAR in infants ≤ 6 months and 0.42 logMAR in children >6 months ($P = 0.002$).

On binary logistic regression using GEEs, poor final visual outcome was associated with low age at presentation (<6 months; $\beta = 0.383$, $P = 0.039$), time between diagnosis and surgery ($\beta = 0.912$, $P = 0.001$), unilateral cataract ($\beta = 0.567$, $P = 0.007$), preoperative nystagmus ($\beta = 0.492$, $P = 0.02$), axial length <18 mm ($\beta = 0.492$, $P = 0.02$), and poor compliance to amblyopia treatment ($\beta = 0.478$, $P = 0.009$). However, it was not associated with mature cataract ($\beta = 0.004$, $P = 0.813$), preoperative strabismus ($\beta = -0.009$, $P = 0.714$), or VAO ($\beta = 0.001$, $P = 0.998$).

DISCUSSION

Despite being currently the leading cause of childhood blindness in Africa,¹⁶ there have been few African reports focusing on demographic profile and outcomes of CC surgery.¹⁶⁻²¹

Familial CC accounted for 13.8% of CC in Uganda¹⁷ and 12.5% in Kenya.¹⁸ In our study, we found a similar proportion of inherited CC (12.7%). Most of our patients came from the northwest side of Tunisia. This region is known by the high prevalence of consanguineous marriages and therefore a higher risk for autosomal recessive diseases, including CC.

Table 2: Study population in terms of age and laterality of congenital cataract

	Bilateral	Unilateral	Total
<2 years	38 eyes	10 eyes	48 eyes
	20 patients	-	30 patients
2-5 years	25 eyes	11 eyes	36 eyes
	14 patients	-	25 patients
Total	63 eyes	21 eyes	84 eyes
	34 patients	-	55 patients

Table 3: Demographic profile and clinical features of the study population

	Study population	<2 years	Between 2 and 5 years	P
Mean age at presentation (months) [mean±SD (range)]	11.94±12.92 (1-60)	5.42±4.730 (3-22)	19.77±12.515 (21-60)	<0.001
Sex ratio (male/female)	1.75	1.73	1.77	0.677
Main presenting complaint (leukocoria)	71.4	72.9	69.4	0.222
Patient with associated systemic/infectious disease (%)	18.2	20	16	0.098
Bilateral cataract (%)	61.8	66.7	56	0.034
Unilateral cataract (%)	38.2	33.3	44	0.029
Total white cataract (%)	72.3	75	68.8	0.071
Mean age at surgery (months) [mean±SD (range)]	23.91±18.5 (3-60)	11.71±8.63 (3-24)	40.19±9.2 (25-60)	0.002
Surgical treatment delay (months) [mean±SD (range)]	11.97±13.841 (1-55)	6.29±5.164 (1-18)	20.42±13.678 (2-55)	0.006
Average follow-up (months) [mean±SD (range)]	27.60±19.897 (12-65)	29.54±19.755 (16-65)	25.02±15.127 (12-59)	0.401

SD: Standard deviation

Table 4: Biometric profile of the study population

	Study population Mean±SD (range)	<2 years Mean±SD (range)	Between 2 and 5 years Mean±SD (range)	P
Axial length (mm)	20.80±2.832 (17.8-25.4)	20.16±2.711 (17.8-24.1)	21.67±2.840 (19.6-25.4)	0.039
Keratometry* (Diopter)	44.65±2.601 (41-47.75)	44.76±2.590 (41.50-47.50)	44.52±2.616 (41-47.75)	0.670
IOL power implanted (Diopter)	22.13±5.812 (15-29)	21.72±3.874 (16-26.50)	22.69±5.911 (15-29)	0.344

*Derived from the mean keratometry value in each case. IOL: Intraocular lens, SD: Standard deviation

Table 5: Intraoperative complications, adverse events, and postoperative complications in study population

	Study population (%)	<2 years (%)	Between 2 and 5 years (%)	P
Intraoperative complications and adverse events				
Escaped anterior capsulorhexis	1 (1.2)	1 (2.1)	0	-
Large posterior capsulorhexis	10 (11.9)	5 (10.4)	4 (11.1)	0.411
Iris prolapse	1 (1.2)	1 (2.1)	0	-
Intraoperative hyphema	1 (1.2)	0	1 (2.1)	-
Sulcus implantation	14 (16.7)	9 (18.7)	5 (13.9)	0.08
Postoperative complications				
Pupillary membranes	18 (21.4)	10 (20.8)	8 (22.2)	0.529
Visual axis opacification	14 (16.7)	9 (18.7)	5 (13.9)	0.112
Additional pars plana membranectomy	9 (10.7)	5 (10.41)	4 (11.11)	0.833

Table 6: Refractive errors and myopic shift (in diopters) in study population

	Refractive errors at 1 month Mean±SD (range)	Early postoperative refractive error target	P	Refractive errors at 2 years from surgery Mean±SD (range)	Refractive shift at 2 years from surgery Mean±SD (range)
<6 months	+6.08±4.13 (+0.50, +11.75)	4.00	0.001	+2.05±4.27 (-3.25, +7.75)	-4.03±1.64 (-8.50, -1.75)
Between 6 months and 1 year	+3.92±2.95 (-0.75, +8.50)	3.00	0.018	+1.63±3.19 (-2.50, +6.25)	-2.29±1.12 (-6.75, -0.50)
Between 1 and 2 years	+1.88±2.32 (-1.75, +7.50)	2.00	0.092	-0.49±2.65 (-3.75, +3.25)	-2.37±0.79 (-5.50, +0.75)
Between 2 and 5 years	+1.4±2.06 (-2.25, +5.75)	1.00	0.021	+0.27±1.43 (-2.00, +2.25)	-1.13±0.42 (-3.75, +1.25)
Study population	+2.9±3.12 (-2.25, +11.75)	-	-	+0.73±2.73 (-3.75, +7.75)	-2.17±0.45 (-8.50, +1.25)

SD: Standard deviation

Mature white cataracts were the most common type of cataract in our morphology subset analysis (72.6%), reflecting the delayed consultation in our patients (11.97 ± 13.84 months). Distance to the health-care facilities, direct and indirect costs of the surgery were the main barriers to access to care. Nevertheless, this delay was lower than in Sub-Saharan Africa, India and China (34 months in Tanzania,²⁰ 20.7 months in South-Africa,²¹ 24.5 months in India²² and 49.6 months in Tanzania,²³ respectively).

Several options are proposed to correct aphakia following CC extraction, including primary IOL implantation, the use of spectacles or contact lenses (CL), or secondary IOL implantation.^{4,6}

Due to socioeconomical and educational factors, CL are assumed to be expensive and impractical for most Tunisian families. Aphakic glasses are also not suitable because they are costly, get lost or broken, and are difficult to fit on infants and young children. The main reason for the poor visual outcome of CC in reports from Uganda¹⁷ and Kenya¹⁸ was thought to be the failure to wear aphakic correction.

Currently, primary IOL implantation after 2 years of age has become a standard practice for most ophthalmologists. Nevertheless, this practice is still debated in children below 2 years. Higher risk of postoperative complications, such as excessive inflammatory response and VAO, are the main limits of primary implantation in young children. There are also concerns about significant refractive errors resulting from the unpredictable ocular growth.^{8,9}

The surgical technique through the anterior route is well standardized.^{4,6} Hydrophobic acrylic monofocal IOLs are the lenses of choice for children.²⁴ Despite several proposed guidelines, there is no consensus regarding amount of IOL power undercorrection.²⁵

CC surgeries in Tunisia are performed as per the international norms. However, immediately sequential bilateral cataract surgery should be considered as the delay between both eyes' surgeries may exceed 4 weeks.²⁶

Regarding intraoperative complications, sulcus implantation was the first complication in our study as well as in the series of Sukhija *et al.*²⁷ The medium and long-term complications of IOL sulcus implantation without rhexis capture include IOL decentration, pigment dispersion glaucoma, and uveitis–glaucoma–hyphema syndrome.²⁸

Pupillary membrane occurred in 20.8% of cases in Group 1. This rate approaches that of Ventura²⁹ and Ram³⁰ series (respectively, 17.2% and 15.6%). Pupillary membrane cleared in all cases with intensive corticosteroid regimen. Fibrinous membrane formation is becoming a rare occurrence owing to better surgical techniques, IOL biocompatibility, and postoperative management.²⁸⁻³⁰

VAO is among major issues in pseudophakic children operated below 2 years and the main cause of additional surgery.²⁶ Significant VAO developed in 31% and 40% of implanted eyes in the IOLunder2 and the Infant Aphakia Treatment Study, respectively.^{13,14}

In contrast, according to the result of our study, significant VAO was seen only in 18.7% of children in Group 1 and in 13.9% of children in Group 2 with a trend toward statistical significance between both groups probably ($P = 0.09$). However, the VAO rate in Group 1 was reasonable and comparable to previously reported data in children implanted with hydrophobic acrylic IOLs (17% of children operated below 1-year-old in Sukhija *et al.*'s case series²⁷).

Furthermore, the only randomized controlled trial so far comparing IOL implantation versus aphakia after bilateral cataract surgery in children younger than 2 years revealed similar low significant VAO (8% [2 of 25] in the aphakic group versus 10% [3 of 29] in the pseudophakic group; $P = 0.76$).¹⁰ Probably, these discordant results are due to the difference in surgical approaches, surgeons' experience, and perioperative medications.

We assume that an optimal surgical technique is the best way to prevent intraoperative complications, iris tissue manipulation and thus VAO. An optimal technique includes adequately sized anterior and posterior capsulorhexis, a meticulous cortical cleanup, an anterior vitrectomy and in-the-bag hydrophobic IOL implantation. Hence, it seems inadequate to reject primary implantation because of an avoidable and curable complication.

Secondary glaucoma remains the most threatening vision complication. No cases of secondary glaucoma have been observed in our series, and similar results have been found in several series with primary implantation.^{10,26,28}

Despite advances in technology and artificial intelligence, IOL power calculation remains a challenging step in the management of CC. Kekunnaya *et al.*³¹ compared four formulae (Hoffer Q, SRK-II, SRK-T, and Holladay 1) and reported absolute prediction error ranging from 2 to 4 diopters regardless of the formula. However, SRK-II gave the least error. In our paper, IOL power was calculated based on SRK-II formula. It was notable that early postoperative refractive error target could not be reached in most cases. This may be explained by several factors including shallow anterior chamber, thick corneas, changes in corneal curvature, and smaller axial length especially in infant eyes. The effective lens position and the postoperative refractive growth are highly unpredictable.³²

The IOL implantation process provides immediate and permanent optical correction with a stable retinal image and potentially minimal aniseikonia and improved binocular vision.

A recently conducted meta-analysis enrolling 675 eyes aimed to analyze the VA between primary IOL implantation and CL wearing, in children below 2 years. The authors concluded that patients with primary implantation owned better VA than those with aphakia but without significant statistical difference.⁸

Our VA results in children operated below 2 years are reasonably good and are consistent with Vasavada *et al.*'s results, where at 5-year follow-up, the mean logMAR acuity

was 0.50 in the pseudophakic group.¹⁰ On multivariate analysis, the time between diagnosis and surgery was found to be a significant variable. Earlier surgery and therefore earlier referral is key for good visual outcomes.

Due to a high proportion of mature cataracts within our study population (>70%), binary logistic regression did not reveal the impact of this independent variable on final visual outcome.

Although strabismus has been identified in most studies to be associated with long-term visual prognosis, it did not show significant impact on final visual outcome in our study. Similarly, Vera *et al.*³³ concluded that infants with preoperative strabismus implanted before 2 years of age showed nonsignificant lower final VA.

Postoperative hyperopia in implanted children is highly amblyogenic during the first 2 years of life. Hyperopia must be accompanied by "IMMEDIATE" refractive error correction with CL or glasses.

Amblyopia remains the biggest barrier to final visual outcome and probably the most common reason for treatable childhood blindness worldwide. Removing the cataract is the "easy" part, but making sure the child is wearing glasses, patching and being followed closely is more important.

To summarize, the overall incidence of serious complications was low in our series, and the achieved visual benefit was reasonable. Primary implantation is achieving promising outcome. Most recent reports suggest reducing the age of implantation in CC to 6 months or even at birth with close monitoring.⁸⁻¹⁰

There are several limitations to this study including a single-center series, a relatively short duration of follow-up, and the lack of complete VA data. Our findings need to be tested in further multicentric studies with longer follow-up.

In conclusion, primary implantation seems to be a worthy option with reasonable rate of adverse events and immediate visual rehabilitation whatever is the age of the child. This surgical approach should be extended beyond countries with limited resources. Accommodative IOLs may 1 day transform the practice of CC surgery by resolving lens power calculation problems.

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Conflicts of interest

There are no conflicts of interest.

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