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Cataract Surgery Outcomes in Bangladeshi Children

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Purpose: To measure visual acuity (VA) outcomes, complication rates, and the social impact of cataract surgery in a cohort who underwent surgery as children in Bangladesh.

Design: Case series.

Participants: A total of 471 of 850 children from 6 Bangladeshi districts who had been identified as cataract blind using key informants (KIs) between 2004 and 2009 during the Bangladesh Childhood Cataract Campaign (BCCC) together with all those children not included in the BCCC database but in the Child Sight Foundation (CSF) database who had been identified as cataract blind.

Methods: The subjects and families were contacted again by KIs and transported to local examination centers, where parents and subjects were administered a questionnaire and subjects underwent full ocular examination. Where operative data were available (15%), they were analyzed in conjunction with questionnaire and examination findings. Statistical analysis was performed using SPSS Statistics (IBM, Armonk, NY).

Main Outcome Measures: Presenting and best-corrected visual acuities (BCVAs), cause(s) of poor outcome, postoperative refraction, and school attendance.

Results: A total of 407 of the participants had undergone bilateral surgery as children, with a mean follow-up of 8.8 years. The mean age at examination was 16 years (range, 5–28 years; standard deviation [SD], 4.6 years); 63% of those examined were male; 22% had a binocular presenting VA of >20/60; and 53% were severely visually impaired or blind (VA <20/200). After refraction, 33% had VA >20/60 in their better eye and 33% had VA <20/200. Factors that predicted poor VA in multivariate logistic regression analysis were nystagmus ($P < 0.001$), longer delay in presentation ($P < 0.001$), and magnitude of absolute spherical equivalent refractive error ($P < 0.001$). Some 50% had nystagmus, and 69% of those currently aged ≤16 years were attending school. Better acuity was associated with school attendance ($P < 0.001$), whereas gender was not.

Conclusions: Approximately one third of all participants had a BCVA of ≥20/60 in their better eye. Amblyopia and nystagmus limited visual outcome, indicating the need for earlier detection and treatment. This is the first study to show the link between pediatric cataract outcome and access to education, a millennium development goal. *Ophthalmology 2015;122:882-887 © 2015 by the American Academy of Ophthalmology.*

Eighty percent of the world's blind children live in the developing world, and cataract is now one of the most common causes of blindness in these children.[1,2] There are few studies of surgical outcome from the developing world.[3–12] These tend to have been hospital-based studies with poor follow-up rates or short follow-up that bias the findings. Outcome studies from the developing world are essential in helping planners develop pediatric cataract services worldwide, prioritizing resources to achieve better visual outcomes.

Most of the participants in this study underwent operation as part of the Bangladesh Childhood Cataract Campaign (BCCC).[13] This campaign ran from 2004 to 2009 and involved identifying more than 30 000 blind children aged <16 years across the country and building the capacity of 8 tertiary-level eye departments and hospitals. As part of this, 16 ophthalmologists were trained in pediatric ophthalmology. The project provided essential equipment for diagnosis and surgery, low-vision aid facilities, and child-friendly waiting areas. All surgical costs were covered by the project.

During the BCCC, the majority of blind children were identified by the Child Sight Foundation (CSF)[14] using the key informant (KI) method. The KI method was first used to identify children with severe visual impairment and blindness as part of a national study of blindness in children in Bangladesh.[15] Key informants, who live within a local community and often have a prominent role, can be effective at identifying sight-impaired children who might otherwise not be identified through special education programs or community-based rehabilitation programs.[16–18]

Bangladesh currently ranks 146 in the United Nations Human Development Index. With a population of 154.7 million in 2012, Bangladesh is one of the most populated countries in the world; 37% of its population are younger than 18 years of age.[19] In 2007, there were estimated to be

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36 000 to 46 000 blind children in Bangladesh, and cataract was the leading cause of blindness (32.5%).[15] The CSF maintains a database of all children confirmed as blind, which includes contact details.

Methods

Six of the 64 districts in Bangladesh were selected for the study (Sirajganj, Natore, Dhaka, Bogra, Tangail, and Manikganj) for logistic reasons and to encompass a range of urban and rural areas.

All subjects in the 6 districts included in the surgical database from BCCC and those not included in the surgical database but in the CSF database of cataract-blind children were eligible for inclusion. Key informants were trained to trace the subjects, explain the study, and inform parents of the date and location of examination.

Examination took place in local examination centers on a particular day by the visiting team, which included 3 experienced ophthalmologists (T.A., S.A., and R.J.C.B.) and 2 optometrists (R.D. and U.M.Yes. TA, SA, RJCB, RD and UM are all authors of the study). Transportation was provided or paid for by the project.

Parents and those subjects who had the capacity to answer were asked a standard set of questions relating to the previous surgery and current school status. Presenting distance visual acuity (VA) was measured with glasses if the subjects had their glasses with them using Tumbling E Snellen Charts at 4 m when possible. Cardiff cards and Teller Preferential Looking charts were used as alternatives. Near VA was assessed using LEA symbols. The subject underwent refraction, and best-corrected VA (BCVA) was measured. Detailed slit-lamp examination was performed when lack of cooperation did not limit its use or severe corneal opacity did not limit views of more posterior structures. In patients in whom the operative records were not available (the majority), judgment was made by the examining ophthalmologist through slit-lamp examination whether an intraocular lens (IOL) had been inserted and a posterior capsulotomy performed. Hospital records were available for 62 participants. Data from the records were used to validate the results of the questionnaire/examination findings. Intraocular pressure was measured using re-bound tonometry (Icare, Vantaa, Finland). When Goldmann tonometry was performed to confirm a high reading or re-bound tonometry was technically not possible, Goldmann readings were used in the analysis.

Statistical analysis was conducted using SPSS Statistics (IBM, Armonk, NY). Analysis was performed using corrected VA in the better eye. Significant predictors of visual outcome were identified using unpaired t tests and linear regression and were then entered into a multiple logistic regression model to investigate independent predictors. A P value <0.05 was deemed statistically significant.

Institutional review board approval was obtained from the London School of Hygiene & Tropical Medicine and the Research, Evaluation, Advocacy and Development Department − CSF center in Dhaka before commencing this study. The study adhered to the tenets of the Declaration of Helsinki. Parental or, when possible, participant informed written consent was obtained before participation in the study. Glasses were provided to all participants at no cost, as required. Those who required further assessment or surgery were sent to the CSF Eye Hospital in Dhaka.

Results

Of the 850 subjects identified as eligible for the study, 656 (77%) were contactable and invited by the KIs to attend an examination, 471 (72%) of whom attended. A total of 64 subjects were excluded; 15 (3%; 11 male, 4 female) had never undergone surgery, 19 (4%) had undergone surgery in their better eye after 16 years of age, and 30 (6%) had undergone unilateral surgery, leaving 407 for analysis. The majority (94%) had undergone operation in the following hospitals: Bangladesh National Society for the Blind Eye Hospital, Siraigani; Islamia Eye Hospital, Dhaka; and Bangladesh Eye Hospital, Dhaka.

Demographic Details

The mean age at examination of those included in the study was 16 years (range, 5−28 years; standard deviation [SD], 4.6 years), which was an average of 8.8 years (range, 1−23 years; SD, 3.8 years) after their first cataract operation. A total of 297 subjects (63%) were male. The average age of the 379 subjects who did not attend was 17 years (range, 7−24 years; SD, 4.2 years), and 278 (73%) were male. Because subjects were recruited using the CSF database of cataract-blind children and the BCCC surgical database, children occasionally had undergone operation before the BCCC; thus the long follow-up for some cases.

Upon questioning, parents first noticed cataracts in their children at an average age of 2.2 years (SD, 3.1). The mean delay between the cataract first being noticed and the surgery was 5.4 years (SD, 4.4). The mean age at their first operation was 7.4 years (SD, 4.59) (Table 1). There was no significant gender differences in age at which cataracts were first noticed, delay in presentation, or age at first operation (2-sample t tests, respective P values: 0.26, 0.65, 0.70, respectively).

In those aged ≥1 year when the cataract was first noticed (n = 199, 51%), the mean delay in presentation was 4.2 years (SD, 3.90), which was shorter (2-sample t test, $P < 0.001$) than in those aged <1 year (n = 195, 49%; mean delay 6.4 years [SD, 4.6 years]). There was no significant difference in VA between hospitals at which the surgery was performed (1-way analysis of variance [ANOVA], $P = 0.082$). Twenty-four subjects (7%) had systemic abnormalities: deafness occurred in 3; heart condition in 1; learning difficulties in 14; combination of deafness, heart condition, and learning difficulties in 5; skin conditions in 2; and Marfan syndrome in 1.

Presenting Visual Acuity

Presenting distance VA was recorded with both eyes open in 347 participants (85%). Only 36 participants (10%) had glasses at examination, 22% of participants had presenting binocular VA ≥20/60, and 53% of participants had VA <20/200.

Binocular presenting near VA was measured in 287 subjects (71%), 34 (12%) with glasses. There was a strong correlation

Table 1. Age at Which the First Eye Operation Took Place, by Gender

	Male		Female		Total	
	N	%	N	%	N	%
Age (yrs)						
0−1	36	12.1	14	12.7	18	4.4
2−4	52	17.5	15	13.6	99	24.3
5−7	25	8.4	29	26.4	90	22.1
8−10	83	27.9	17	15.5	64	15.7
11−13	55	18.5	16	14.5	71	17.4
14−16	32	10.8	12	10.9	44	10.8
Missing	14	4.7	7	6.4	21	5.2
Total	297	100	110	100	407	100