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Outcome of pediatric cataract surgery in Northwest Ethiopia: a retrospective case series

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Synopsis: Most eyes achieved 6/60 or better after surgery. In bilateral cataract cases poor outcomes were associated with nystagmus/strabismus; in traumatic cases trauma related complications were associated with poor outcomes.

Outcome of pediatric cataract surgery in Northwest Ethiopia: a retrospective case series

Mulusew Asferaw, Sisay Yoseph Mekonen, Geoffrey Woodruff, Clare Gilbert, Samson Tesfaye

ABSTRACT

Aim: To assess visual acuity outcomes, and factors associated with the outcome, of pediatric cataract surgery at the Child Eye Health Tertiary Facility, Gondar, Northwest Ethiopia.

Methods: The medical records of children aged below 16 years who underwent cataract surgery between September 2010 and August 2014 were reviewed for preoperative, surgical and postoperative data.

Results: One hundred seventy six eyes of 142children (mean age 7.9 years ± 4.2 [SD], 66% males) who had cataract surgery were included. Twenty-five percent (35/142) of children had bilateral cataract, 18 (13%) had unilateral non-traumatic and 89 (63%) had unilateral traumatic cataracts. An intraocular lens was implanted in 93% of eyes. Visual acuities at last follow up: bilateral cases in the better eye: good (≥6/18 or fix and follow) in21/34 eyes (62%), borderline (<6/18-6/60) in 4 (12%) eyes and poor (<6/60) in 9 (26%) eyes. In unilateral non-traumatic cases: good 6 eyes (33%); borderline 3 (17%) and poor 9 (50%).In unilateral traumatic cases: good 36 eyes (40%); borderline 20 (23%) and poor 33 (37%) eyes. In bilateral cataract worse outcomes were associated with pre-operative nystagmus/strabismus. In traumatic cases, worse outcomes were associated with the preoperative trauma related complications.

Conclusions: Visual acuity improved significantly after surgery, with better outcomes in bilateral cases. Early detection and surgery by a trained surgeon with good follow up and postoperative rehabilitation can lead to better visual outcomes.

Key words: Pediatric cataract, visual outcome, congenital cataract, Ethiopia

INTRODUCTION

Up to a third of blindness in children in sub-Saharan Africa is due to congenital or developmental cataract, with approximately19, 000 new cases each year.[1] With the reduction of corneal blindness associated with measles and vitamin A deficiency, cataract is becoming an increasingly important cause of avoidable blindness in children in low income settings. Well documented challenges in achieving good outcomes after surgery in Africa are late presentation, surgical complications, poor follow up for refractive correction and management of visual axis opacification. In some regions there are gender differences in access.[2] However, good results can be achieved by early meticulous surgery with aggressive management of the posterior capsule, intensive treatment of post-operative uveitis and good visual rehabilitation and follow up.[3,4]

The prevalence of blindness in children in Ethiopia is estimated to be approximately 1 in 1000 children.[5] Cataract accounted for 10%[6,7] of the causes of blindness in two studies from Ethiopian schools for the blind, while a population based key informant study found cataract to be the commonest cause of blindness (33%) in Southern Ethiopia.[8] Only a few studies have reported visual acuity outcomes in children following cataract surgery in Africa[9-14] with only one study of 73cases from Ethiopia.[15]

The World Health Organization (WHO) recommends that paediatric cataract surgery be undertaken in tertiary level eye care facilities with one facility per 10 million populations. With support from Orbis International, Gondar University Hospital established a tertiary pediatric eye unit in 2012 with a trained paediatric ophthalmologist and support team. The purpose of this study was to assess the outcome of paediatric cataract surgery at this centre. The findings will guide improvements in the management of paediatric cataract in the region and more widely.

PATIENTS AND METHODS

Study setting

The study was conducted at the University of Gondar Referral hospital, Northwest Ethiopia, which is the only tertiary eye care and referral centre for an estimated population of20million, almost half of whom are children. Before 2012 the standard pediatric cataract surgical procedure was extra capsular cataract extraction (ECCE), mainly in the form of manual small incision cataract surgery without primary posterior capsulotomy, performed by senior non-pediatric ophthalmologists. Since 2012 the currently recommended paediatric cataract surgery of lens aspiration with primary posterior capsulotomy (PPC) and anterior vitrectomy (AV)[16] has been performed by an ophthalmologist trained in paediatric ophthalmology. Biometry has been performed routinely. Subconjunctival steroids are given to all eyes at the end of surgery. Cataract surgery is usually performed under general anaesthesia, with local anesthesia for older cooperative children. Most bilateral cases have both eyes operated under general anesthesia at the same session following strict procedures (i.e., new surgical set and re-scrubbing between eyes). This approach is adopted to reduce the risk of a second anesthesia, to ensure that second eyes are operated on without delay, and to reduce costs for parents. Children are usually seen on day 1(at discharge), and at one week and one month after surgery.

Study design: Retrospective case series

All children aged 0-15 years undergoing cataract surgery between September 2010 and August 2014 were identified from the operating theatre logbook and their medical records were reviewed for demographic, pre-operative, intra-operative and post-operative information by the principal investigator (MA, a paediatric ophthalmologist).

Preoperative data included address, age at surgery, gender, pre-operative visual acuity (VA) and the method of measurement, type and laterality of cataract, interval between the recognition of cataract by the parents and admission to hospital for surgery, the presence of ocular and systemic co-morbidities, and method of intraocular lens (IOL) power calculation. Surgical data included date of surgery, surgical technique and method of anaesthesia. Details of the surgical techniques included method of anterior capsulotomy, whether PPC and AV were performed, whether an intraocular lens (IOL) was inserted and site of placement, intra-operative complications, and surgeon profile. Postoperative complications and interventions, duration and total number of follow-up visits, and presenting VA at the last visit were also documented.

Definitions

Visual outcomes are reported as presenting VA measured at the last post-operative follow up visit and defined as good (VA≥6/18 or fix and follow (FF)), borderline (VA <6/18-6/60), or poor outcome(VA<6/60 or poor fixation pattern). We defined congenital cataract as a cataract manifested in the first year of life. Developmental cataract was defined as the cataract that developed after the first year of life. Postoperative complications which occurred within four weeks of surgery were defined as early, and complications after four weeks were defined as late.

Data analysis

Data were entered into Epi info version 3.3.2, and exported into SPSS version 16 for analysis. Multivariate binary logistic regression analysis was undertaken to determine predictors of postoperative VA outcomes for bilateral and traumatic cases separately. Unilateral non-traumatic cases were not included in the regression analysis because of the small number in this group. Visual outcome was defined as a dichotomous variable: Good/Borderline Outcome (VA ≥6/60 or FF) or Poor outcome (VA<6/60) (). In bilateral cases, analysis was based on the visual acuity outcome in the better-seeing eye. One child who had only one eye operated was excluded from this analysis. Variables included for multivariate regression analysis for both groups (bilateral and traumatic cataract groups) were only those with P value <0.2 in univariate analysis, and all variables with P value < 0.2 were entered simultaneously. A p value <0.05 was considered statistically significant.

Ethical considerations

The protocol of the study was approved by the institutional review board of the University of Gondar.

RESULTS

A total of 160 children with cataract were operated over the four year period. Complete data were available for 142 (89%) children of whom 35 (25%) had bilateral, 18 had non-traumatic unilateral,

and 89 had unilateral traumatic cataract. The mean age at surgery was 7.9 (range 0.2-15) years. Children having surgery for bilateral cataracts were younger (mean 5.8, range 0.3-15 years) than the other two groups: unilateral non-traumatic cases (mean 7.0, range 0.2-14 years) and traumatic cases (mean 9.8, range 4-15 years) years. There was a preponderance of boys (66%) over girls, particularly for traumatic cataract (71%). The children were referred from 41 districts of the four regional states. The majority of children (94%) came from Amhara regional state and most (56%) lived more than 100km from the hospital (Table 1).

Table 1: Demographic Characteristics of Children with Cataract (N= 142 children)

	Bilateral(N=35), n (%)	Unilateral non-traumatic(N=18), n (%)	Unilateral traumatic (N=89), n (%)
Age at surgery (year)			
<5	17 (48.6)	6 (33.3)	2 (2.2)
5-10	10 (28.6)	10 (55.6)	49 (55.1)
11-15	8 (22.8)	2 (11.1)	38 (42.7)
Sex			
Male	20 (57.1)	11 (61.1)	63 (70.8)
Female	15 (42.9)	7 (38.9)	26 (29.2)
Address by Region			
Amhara	32 (91.4)	15 (83.3)	87 (97.6)
Tigray	1 (2.8)	3 (16.7)	2 (2.2)
Others*	2(5.7)	-	-
Approximate distance fromhospital			
≤100 kms	18 (51.4)	6 (33.3)	39 (43.8)
>100 kms	17 (48.6)	12 (66.7)	50 (56.2)

*Southern Nations, Nationalities and People Region (1), BenshangulGumuz (1)

Visual acuity(VA)was assessed using Snellen acuity charts, Cardiff cards, LEA symbols and by assessing the fixation pattern in younger children. Among 176 eyes which had surgery, it was possible to record Snellen VA in 142 (81%) eyes pre-operatively and 148(84.1 %)eyes postoperatively. Before surgery 13 of the 34 better seeing eyes of bilateral cases could fix and follow (7 eyes), had poor fixation (6 eyes) or acuity was not recorded (1 eye); after surgery 12 of these eyes could fix and follow. Among the 18 eyes with unilateral non traumatic cataract, four had poor fixation before surgery; after surgery one eye had poor fixation and two could fix and follow. Among the 89 traumatic cases in two the visual acuity was not recorded preoperatively; after surgery 1 eye

could fix and follow. Best corrected visual acuity was not recorded in the medical records for 73 (41.5%) eyes. Overall, among the eyes recorded with Snellen VA, before surgery 5/142 eyes (4%) had a presenting VA of 6/6-6/18 and 131 (92%) had <6/60. Postoperatively 55/148 eyes (37%) had a presenting VA of 6/6-6/18 and 64 (43%) had <6/60.

For each type of cataract the proportion of children with a presenting VA of <3/60 after surgery was lower than the proportion before surgery (Figure 1).The proportion with a VA 6/6-6/18 or FF increased following surgery in all types of cataract, with better outcomes in bilateral cases compared to the other types (58% bilateral; 40% traumatic; 33% unilateral non traumatic).

Bilateral cataract

Sixty-nine eyes of 35 children with bilateral cataract were operated; one child had surgery to only one eye. Most bilateral cases (86%, 30/35 children) were operated at a single session. The interval between recognition of a problem in the eye and surgery ranged from 3 weeks to 156 months(median25 months).Before surgery 58% of these eyes were blind (VA <3/60). Nystagmus was present in 24(35%) eyes and strabismus in 13(19%) eyes. The commonest type of surgery under the age of 10 years was lens aspiration with posterior capsulotomy and AV (55%).An IOL was implanted in 97% of operated eyes, mostly acrylic foldable IOLs (61%)(Table 2). The most common intraoperative complications were radial anterior capsulotomy tears (7 eyes, 10%) and posterior capsular rupture with or without vitreous loss (5 eyes, 7%). The most common early post-operative complication was fibrinous uveitis (4 eyes, 6%) whereas visual axis opacification was the commonest late post-operative complication which developed in 16 eyes (23%). Surgical capsulotomy was required in 12 eyes and YAG capsulotomy in two eyes. Glaucoma occurred in one eye which was controlled medically (Table 3).

Table 2: Pre-and intra-operative characteristics in operated eyes (N=176)

	Bilateral (N=69), n (%)	**Unilateral non-traumatic (N=18), n (%)**	**Unilateral traumatic (N=89), n (%)**
Delay to surgery (months)[†]			
Median (minimum, maximum)	25 (<1-156)	18 (<1 - 91)	3 weeks (<1-91)
≤6	9 (13.0)	5 (27.8)	72 (80.9)
>6 – 12	7 (10.1)	1 (5.6)	2 (2.2)
12 -18	18 (26.1)	3 (16.6)	8 (9.0)
>18	35 (50.7)	9 (50.0)	7 (7.9)
Preoperative presenting VA			
≥6/18 or fixes and follows	18 (26.1)	-	-
<6/18 - 6/60	4 (5.8)	1 (5.6)	1 (1.1)
<6/60 or poor fixation pattern[§]	47 (68.1)	17 (94.4)	88 (98.9)
Associated ocular co-morbidity			
Nystagmus	24 (34.8)	1 (5.6)	-
Strabismus	13 (18.8)	7 (38.9)	2 (2.2)
Corneal scar/opacity	-	-	26 (29.2)
Posterior/anterior synecheae	-	-	14 (15.7)
Corneal tear	-	-	14 (15.7)
Iris sphincter tear	-	-	3 (3.4)

Traumatic mydriasis	-	-	3 (3.4)
Iridodialysis	-	-	3 (3.4)
Dislocated/subluxated lens	-	1 (5.6)	2 (2.2)
Corneal foreign body	-	-	1 (1.1)
Retinal detachment	-	-	1 (1.1)
Surgical procedure			
LA+PPC+AV+PC IOL	38 (55.1)	9 (50.0)	28 (31.5)
LA+PC IOL	27 (39.1)	7 (38.9)	51 (57.3)
LA+PPC+PC IOL	2 (2.9)	-	1 (1.1)
Lensectomy with no IOL	2 (2.9)	2 (11.1)	2 (2.2)
LA with no IOL	-	-	6 (6.7)
LA +AC IOL	-	-	1 (1.1)
Type of anterior capsulotomy			
Vitrectorhexis	51 (73.9)	13 (72.2)	44 (49.4)
V-capsulotomy	16 (23.2)	5 (27.8)	44 (49.4)
CCC	2 (2.9)	-	1 (1.1)
Type of IOL			
Foldable	42 (60.9)	9 (50.0)	35 (39.3)
PMMA	25 (36.2)	7 (38.9)	45 (50.6)
No IOL	2 (2.9)	2 (11.1)	9 (10.1)
Site of IOL implanted			
In the bag	55 (79.7)	7 (38.9)	36 (40.4)
Sulcus	7 (10.1)	7 (38.9)	21 (23.6)
AC	-	-	1 (1.1)
No IOL	2 (2.9)	2 (11.1)	9 (10.1)
Unknown	5 (7.2)	2 (11.1)	22 (24.7)

[¶]Interval between recognition of cataract in the eye by care givers and admission to hospital for surgery; [§] Four eyes with undetermined vision (2 in bilateral, 2 in unilateral traumatic) were included under VA<6/60 or poor fixation category.
VA: Visual Acuity; LA: Lens Aspiration; PPC: Primary Posterior Capsulotomy, AV: Anterior Vitrectomy; PC IOL: Posterior Chamber IntraOcular Lens,; ACIOL: Anterior Chamber Intra Ocular Lens; PC:Posterior Capsule; PMMA: polymethylmethaacrylate; CCC: continuous curvilinear capsulorhexis

Table 3: Surgical complications, postoperative interventions and number of follow-up visits

	Bilateral (N=69 eyes) n (%)	Unilateral non-traumatic (N=18 eyes) n (%)	Unilateral traumatic (N=89 eyes), n (%)
Intra operative complication			
Radial tear of capsulotomy	7 (10.1)	1 (5.6)	10 (11.2)
PC rupture without vitreous loss	5 (7.2)	2 (11.3)	1 (1.1)
Vitreous loss only	1 (1.4)	-	1 (1.1)
PC rupture with vitreous loss	-	4 (22.2)	4 (4.5)
Early postoperative complication (up to four weeks)			
Fibrinous uveitis	4 (5.8)	2 (11.1)	19 (21.3)
Striate keratopathy/corneal oedema	2 (2.9)	2 (11.1)	16 (18.0)
Lens matter remnant	1 (1.4)	-	7 (7.9)
Pupillary capture of IOL	1 (1.4)	1 (5.6)	-
IOL decentration	-	-	5 (5.6)
Endophthalmitis	-	-	3 (3.4)
Iris prolapsed	-	-	2 (2.2)
Shallow anterior chamber	-	-	1 (1.1)
Late postoperative complication (after four weeks)			
Visual axis opacification	16 (23.2)	1 (5.6)	13 (14.6)
Pupilary capture of IOL	4 (5.8)	-	2 (2.2)
Decentration of IOL	2 (2.9)	1 (5.6)	1 (1.1)
Glaucoma	1 (1.4)	-	1 (1.1)
Secondary membrane	-	-	1 (1.1)
Vitreous haemorrhage	-	-	1 (1.1)
Postoperative intervention			
Surgical			
Surgical capsulotomy/membranectomy	12 (17.4)	2 (11.1)	10 (4.2)
IOL repositioning	5 (7.2)	2 (11.1)	3 (3.4)
YAG capsulotomy	2 (2.9)	-	4 (4.5)
Excision of limbal conjunctival cyst	1 (1.4)	-	-
Aspiration of lens matter	-	-	2 (2.2)
IOL replacement	-	-	1 (1.1)
Medical			
Spectacle prescribed	28 (40.6)	6 (33.3)	14 (15.7)
Patching therapy	23 (33.8)	9 (50.0)	8 (9.0)
Systemic steroid	2 (2.9)	1 (5.6)	12 (13.5)
Total number of follow-up visits			
1	8 (11.6)	2 (11.1)	16 (18.0)
2	20 (29.0)	6 (33.3)	26 (29.2)
3	20 (29.0)	5 (27.8)	28 (31.5)
4	7 (10.1)	2 (11.1)	9 (10.1)
5	4 (5.8)	2 (11.1)	5 (5.6)
6	8 (11.6)	1 (5.6)	2 (2.2)
7	2 (2.9)	-	3 (3.4)

PC:Posterior capsule; IOL: Intra Ocular Lens

Follow up after surgery ranged from day 1 to 33 months (median 2.8 months) and 41 (59%) had at least three follow up visits. Among 34 cases with bilateral cataract where better seeing eyes were analyzed, 17 (50%) children had follow up for 3 months or more and 17 (50%) had less than 3 months of follow up.

Visual outcome

Total operated eyes: At their last recorded follow up, among 45 eyes with quantitative Snellen acuity, 16/45 eyes (36%) had a presenting VA of 6/6 - 6/18, 6 eyes (13%) had 6/24-6/60, and 23 eyes (51%) had <6/60. In 24/69 (35%) bilateral cataract eyes, a Snellen acuity could not be measured post operatively, but the eye was able to fix and follow. If these eyes are categorized as having a good outcome, the number of bilateral cataract eyes achieving a good outcome is 40 (58%), borderline 6 (8%), and poor outcome 23 (33%).There was no statistically significant difference in postoperative visual acuity between cataracts classified as developmental or congenital (p=0.62).

Better eye: Among 34 children with both eyes operated, visual outcome in the better-seeing eye was analyzed: good outcome (≥ 6/18 or FF) in 21 (62%) of children, borderline in 4(12%), and poor outcome in 9 (26%).

Unilateral non-traumatic cataract

Before surgery 94% (17/18) of operated eyes were blind (VA< 3/60). Strabismus was present in seven eyes (39%) and nystagmus in one eye. The delay to surgery ranged from 1 week to 91 months (median 18 months). The commonest type of surgery in this group was lens aspiration with PPV and AV in nine eyes (50%) followed by lens aspiration without posterior capsulotomy. An IOL was implanted in 89 % eyes. The commonest intraoperative complication was posterior capsular rupture with vitreous loss, which occurred in 4 eyes (22%). Fibrinous uveitis and striate keratopathy occurred in two eyes each. Visual axis opacification was a rare (6%) complication in this group (Table 3).

Follow up after surgery ranged from 1 day to 6 months (median 1 month), 14 (77.8%) had less than 3 month follow up, only 4 (22.2%) had follow up for 3 or more months and 56 % of eyes had at least three follow up visits. At their last follow up, four eyes (22%) achieved 6/6-6/18, two (11%) fix and follow, one (5.6%), three (17%) 6/24-6/60and 8 eyes (44%) had <6/60. In summary, six eyes (33%) had good, three (17%) borderline, and nine eyes (50%) poor visual outcome in this group.

Traumatic cataract

A corneal tear repair was required at the time of cataract surgery in 13/89(14.7%) eyes. There was multiple other trauma related ocular pathology including corneal scar or opacity in 26 (29.2%) eyes and synechiae in 14 eyes (15.7%). Preoperatively, 85 eyes (95.5%) were blind (VA < 3/60). The commonest surgical procedure was lens aspiration without vitrectomy in 51 eyes (57.3%) and an IOL was not implanted in nine eyes (10.1%) (Table 2). The commonest intraoperative complication was radial tear of anterior capsulotomy (10 eyes, 11.2%) whereas the most frequent postoperative complications were fibrinous Uveitis (21.3%), corneal edema (18.0%) and visual axis opacification (14.6%). Endophthalmitis occurred in three eyes (3.4%) (Table 3).

Follow up after surgery ranged from 1 day to 12.4 months (median 1.2 month), 63 (70.8%) of children had less than 3 month follow up, 26 (29.2%) had follow up for 3 or more months, and 52.8% of the eyes had three or more follow ups. After surgery, visual outcome was 6/6-6/18 in 35 eyes (39%),fix and follow in one eye (1%), 6/24-6/60 in 20 eyes (22%), and<6/60 in 33 eyes (37%).

Factors associated with visual outcome

Bilateral cases:

Regression analysis was carried out to determine factors associated with poor visual outcome in the better seeing eye in the 34 children with bilateral cataract. The variables that were analyzed are shown on table 4. In univaraiate and multivatiate analysis, only the presence of ocular co-morbidities i.e., strabismus or nystagmus, was significantly associated with poor outcome (<6/60) than those without co-morbidities (Odds ratio (OR) 10.63 (95% CI, 1.22 -92.34, p=0.03).

Table 4: Factors associated with poor visual outcome in children with bilateral developmental or congenital cataract based on the better-seeing eye (N=34).

	Good or Borderline Outcome (≥6/60/FF)	Poor Outcome (<6/60)	Crude OR (95% CI)	*P*-value	Adjusted OR (95% CI)	*P*-value
Age at surgery (year) Mean=5.7, SD=4.6	-	–	1.01 (0.85 – 1.19)	0.94	–	–
Gender						
Male	13	6	0.93 (0.24 – 3.50)	0.91	-	-
Female	12	3	Reference			
Type of cataract						
Developmental	10	5	1.88 (0.40 – 8.74)	0.42	-	-
Congenital	15	4	Reference			
Delay to Surgery (month)¶ Mean=3.4, SD=3.4	-	-	1.02 (0.99 – 1.05)	0.09	1.03 (0.99 – 1.07)	0.09
Ocular co-morbidities(nystagmus/ strabismus)						
Present	6	7	11.08 (1.80 – 68.40)	0.01	10.63 (1.22 – 92.34)	0.03
Absent	19	2	Reference		Reference	
PPC						
Not performed	12	1	0.50 (0.05 – 4.98	0.08	0.07 (0.002 – 1.99)	0.12
Performed	13	8	Reference		Reference	
Intra-operative complications						
Present	5	1	0.07 (0.002 – 1.99)	0.55	-	-

Absent	20	8	Reference			
Postoperative complications						
Present	10	1	0.19 (0.02 – 1.74)	0.14	0.42 (0.03 – 5.75)	
Absent	15	8	Reference		Reference	
Duration of follow-up (months) Mean=5.8, SD=9.2			0.80 (0.55 – 1.16)	0.24	-	-

CI: Confidence Interval; PPC: Primary Posterior Capsulotomy; AV: Anterior Vitrectomy
¶indicates interval between recognition of cataract in the eye by care givers and admission to hospital for surgery

Traumatic cases:

Only pre-existing trauma related ocular co-morbidity was significantly associated with poor outcome in univariate and multivariate analysis in traumatic cataracts (OR = 6.23; 95% CI 2.01 – 19.25, p=0.001).

DISCUSSION

Over half of eyes of better seeing eyes in bilateral cases in our series achieved a VA ≥6/18, or could fix and follow. It is difficult to compare our study with others because of the difficulties in recording VA in children, particularly in young children and this is reflected in the large proportion of children with bilateral cataract in whom a Snellen acuity was not recorded. Children recorded as being able to fix and follow but without a Snellen VA were included in our good visual outcome category but the imprecision of this acuity assessment is a limitation of our study. It has been suggested that younger children may have better results because they may have had less delay between the onset of cataract and treatment, or alternatively, that they may have worse results because of the onset of cataract at a younger age. The limitations of our data prevent us from definitively resolving this issue, and the classifications of cases as congenital or developmental were based on parental recall.. We used presenting VA to assess visual outcome as best corrected VA was not recorded in 41.5% of eyes implying that refraction may not have been undertaken at every visit. In addition, our intention was to include whether surgery was performed by a trained pediatric ophthalmologist or a qualified ophthalmologist experienced in adult surgery in the regression analysis but this was not possible as some cells contained no data.

Our results for good outcome in the better eye (62%) among bilateral cases are comparable to studies in Tanzania (62%),[10], Nepal and Northern India (43%),[4] Kenya (44%),[9] South India (39.5%),[17] UK (40.6%),[18] and USA (46.6%),[19] but much better than in studies from Zambia (29.7%)[13] and South Africa (24.7%).[14] Good visual outcome was achieved more often in bilateral cases compared to unilateral non-traumatic cases.

Only 33% of eyes in unilateral non-traumatic cataract achieved good outcome (≥ 6/18) and with half of the eyes having a poor visual outcome (<6/60) with median follow up period of one month. This finding is similar to the study in India where best corrected visual acuity was 6/18 or better in 25% and <6/60 in 66.7% of unilateral congenital and developmental cataracts at mean follow up of 4.4 years.[20] The poor outcome in a significant number of eyes in unilateral cases can be explained by deep deprivational amblyopia.

Thirty-five eyes (39%) with traumatic cataract had a VA of 6/18 or better. This is slightly lower than in studies in Zambia (68%),[13] and the previous study in Southern Ethiopia (64.7%).[21]

There was a substantial improvement in VA for each type of cataract, with the greatest improvement being in traumatic cases, no doubt reflecting the lower risk of amblyopia in children who developed cataract later in childhood. The finding of a relatively good acuity in a few children with non-traumatic cataract may be because of undetected trauma, or later onset of cataract.

In this study, the mean age at surgery was 5.8 years and 7 years in bilateral and unilateral non-traumatic cases, respectively. Children with traumatic cataract were older (mean 9.8 years). This is similar to the findings in the previous study in Ethiopia(mean 7.1yr)[15] and other studies in developing countries.[3, 10-12] However**,** the age at surgery for non-traumatic cases in our study was higher than a report from developed countries.[18] A study from Kenya also showed a younger age at surgery compared to our study.[9]

To achieve better visual outcome in children, earlier cataract surgery is recommended. However, the finding in this study showed late presentation with a median delay to surgery of 25 months and 18 months in bilateral and unilateral non-traumatic cases, respectively. This delay will result in significant deprivational amblyopia, reflected in the high rates of nystagmus and strabismus which were associated with poorer outcomes. A mean delay of almost 3 years between first recognition of an abnormality by parents/caregivers and surgery for congenital and developmental cataract was reported ina study from Tanzania.[22] Delay in presentation was associated with developmental cataract, living far from the hospital and low socio-educational status of the mother. Complex interactions between socio-cultural barriers at family and community level as well as socio-organizational barriers within the health care system also contributed to delay in presentation.[23]

However, our study showed that delay between presentation and surgery did not greatly affect outcomes. This is in line with two studies from India[24,25] but unlike results from China.[26]

The high proportion of traumatic cataract in this series is worth noting, being higher than studies from Southern Ethiopia (36.3%),[15] Madagascar (25.6%),[11] and Nepal(23.9%).[3] In contrast, in high income settings, trauma accounts for only 10-29% of cases.[27] The high proportion of traumatic cataract in our series may be because in Ethiopia children are often involved in agriculture, and the sudden pain and loss of vision will stimulate different health seeking behavior by parents compared to that for children with longstanding, painless loss of vision for which parents may have no explanation or attribute to spiritual causes. The finding from the recent key informant study that bilateral cataract was the leading cause of blindness in children indicates the need for active community-based case finding with referral for assessment, surgery and counseling.[8]

In this series follow up after cataract surgery was inadequate. Before surgery parents need to be counseled that surgery is only the first stage, and that postoperative visual rehabilitation that includes amblyopia therapy, correction of refractive error and low vision therapy are all important. Barriers to follow up have been reported from Tanzania and included being a girl with bilateral cataract, poorly educated mothers, a large number of siblings and delay in initial presentation for surgery.[28] Multiple strategies were used to improve follow up, including reimbursement of transport costs, a dedicated childhood blindness coordinator, tracking children after surgery, good counseling of parents, and use of cell phones reminders.[29]

In this study limitations included poor documentation of relevant details in medical records, lack of standard definitions, methods of measuring VA, and difficulty in distinguishing congenital from developmental cataract. Selection bias is also likely, as severely injured eyes might have developed endophthalmitis or not be operated on if the prognosis was poor. Visual acuity findings have to be interpreted cautiously, given the relatively short follow up. Electronic medical records may improve documentation.

CONCLUSIONS

The short term visual outcome after cataract surgery was fair as the majority achieved a VA of 6/60 or better. There was a significant delay in presentation particularly in non-traumatic cases. The presence of nystagmus/strabismus in bilateral cases and trauma related complications in traumatic cases were predictors of poor visual outcome. To address cataract blindness active case finding combined with counseling parents and clear referral pathways are needed. Surgery should be undertaken by a pediatric ophthalmologist in a fully equipped unit, with trained support staff, and multiple strategies are likely to be required to improve follow up after surgery. Prospective studies are being set up to address some of the limitations identified in this case series.

Contributors MA, SY, and ST conceived of the study. MA collected the data. SY did statistical analysis of the data. MA, GW and CG further analyzed the data. All the authors contributed to the manuscript and approved the final draft for submission.

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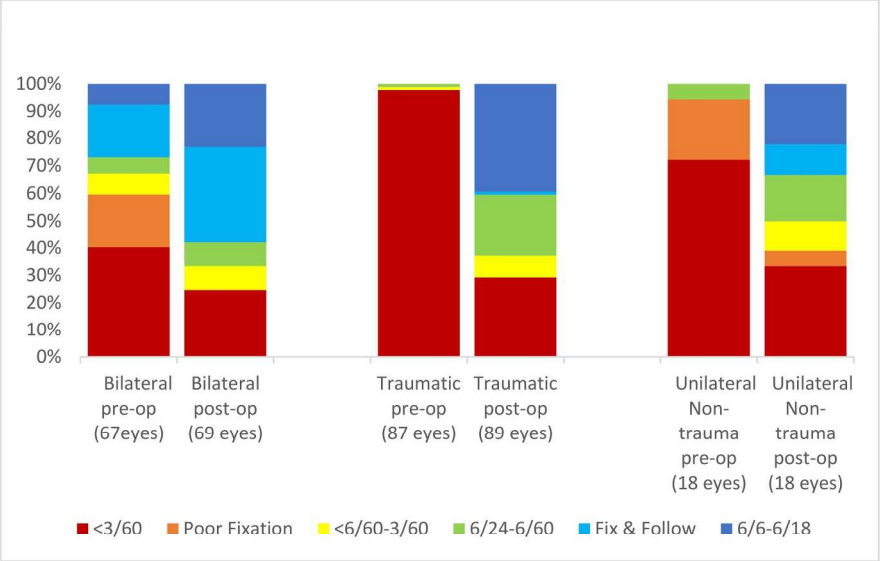

Figure 1. Percent of eyes with each category of VA before and after cataract surgery.

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