Traumatic pediatric cataract in southern Ethiopia—results of 49 cases

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PURPOSE To report the experience of two tertiary care facilities in southern Ethiopia in the treatment of traumatic pediatric cataract for a period of more than 1 year.

METHODS The medical records of consecutive traumatic pediatric cataract patients who underwent surgery at the Hawassa University and the Yirgalem University schools of medicine from July 2007 to August 2008 were retrospectively reviewed. All patients with a follow-up of at least 12 months were included.

RESULTS A total of 49 children were included. Mean patient age was 8.6 ± 0.3 years (range, 5-15 years). Of the 49 cases, 32 (65%) were caused by blunt trauma. Average follow-up period was 15 months. Postoperative visual acuity of counting fingers or better was achieved in 43 (88%) eyes compared with 5 (10%) at presentation ($P < 0.0001$). Better visual acuity at presentation and blunt trauma were associated with better final visual acuity. Only blunt trauma was found by multivariate analysis to influence final visual acuity ($P = 0.0001$).

CONCLUSIONS Visual acuity of counting fingers or better visual can be achieved in most cases. Blunt trauma is a good independent prognostic factor for visual acuity. (J AAPOS 2013;17:512-515)

In the developing world, pediatric cataract is considered one of the leading causes of avoidable and treatable blindness.[1,2] Data from the last decade reveal that in India, for example, up to 15% of childhood blindness is because of cataract.[3] In other studies, the proportion is even higher reaching almost 40%.[4]

Trauma accounts for as much as 29% of all pediatric cataract, and among children aged 6-15 years the incidence is as high as 41%.[5] To date, studies on the management of pediatric traumatic cataract in rural areas have reported a relatively short follow-up period. Shah and colleagues[6] reported the outcome of pediatric traumatic cataract management with a 6-week follow-up. Wilson and colleagues[7] reported a large-scale study from Nepal in which the average follow-up period was 1 month for fewer than 50 children with traumatic cataract who were followed for more than a period of 6 months. On the other hand, Sminia and colleagues[8] reported a 10-year follow-up on iris fixation technique in lenses of children with traumatic cataract, but the study group included only 5 children. A recent study by Verma and colleagues[9] prospectively followed 30 children with traumatic cataract with and without primary posterior capsulotomy after intraocular lens (IOL) implantation.

Long-term follow-up in children is necessary to assess accurately visual potential because surgery-related complications and amblyopia can develop frequently in the late postoperative period and can limit the visual outcome. The present study extends our previous report[10] on the treatment of pediatric cataract at two tertiary-care centers in rural Ethiopia by providing results for a follow-up period of at least 12 months.

Subjects and Methods

This work was approved by the Hawassa University Health College Institutional Review Board. The medical records of consecutive pediatric traumatic cataract cases diagnosed and treated surgically from July 2007 to August 2008 at the Hawassa University and the Yirgalem University schools of medicine, located in southern Ethiopia, were retrospectively reviewed. All children were aged <16 years and operated on by a single surgeon (IBZ). The follow-up period for each patient was at least 12 months.

Data on clinical assessment and management at the Hawassa Center have been reported elsewhere.[10] In brief, all children were diagnosed with traumatic cataract using standard ophthalmic equipment. IOL power was estimated according to biometric measurements (axial length and keratometry) using the SRKII formula. When it was not possible to obtain such measurements, fellow eye refraction was used to help determine the required IOL power. Because all cases consisted of mature or significant cataract, uncorrected visual acuity was estimated with regard to patient age and level of cooperation. Tribal language translators

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This study was part of the ORBIS International and Cyber-Sight project implementing pediatric ophthalmology services in Ethiopia.

Submitted January 28, 2013.

Revision accepted June 3, 2013.

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1091-8531/$36.00

http://dx.doi.org/10.1016/j.jaapos.2013.06.008

assisted during examinations as needed. We examined the effect of the following variables on final visual acuity: sex, age, laterality of injury, mechanism of injury, IOL implantation, and visual acuity at presentation. For statistical analysis, visual acuity was converted to the logarithm of the minimum angle of resolution with low visual acuities substituted as follows: counting fingers, 1.7; hand movements, 2.0; light perception, 2.5; and no light perception, 3.0.[11] Postoperative visual acuity was evaluated with no correction if an IOL was inserted and with aphakic lenses if the patient was aphakic.

Statistical analysis was performed using SPSS (version 13, SPSS Inc, IL). Statistical significance of quantitative and categorical variables was performed using the *t* test and the Pearson χ^2 test, respectively. Multivariable relationships were analyzed using a logistic regression model. All results are presented as mean ± standard error of the mean.

Results

During the study period, 65 children with traumatic cataract underwent surgery. Of these, 16 children were lost to follow-up and were therefore excluded from this study. There was no difference between these children and those that were included in age at the time of surgery, sex, visual acuity before surgery, and mechanism of cataract. Of the 49 children included, 44 were boys; mean patient age at the time of surgery was 8.6 ± 0.3 years (range, 5-15 years); and 33 cases (67%) involved the right eye. Causes of trauma included 32 cases (65%) of blunt trauma (half were caused by donkey kicks) and 17 cases (35%) of perforating eye injuries.

In all cases, surgery entailed manual lens aspiration using an irrigation aspiration cannula. In 32 cases, the aspiration was done through a scleral tunnel and in 17 cases through a clear corneal incision. In all cases, an attempt was made to leave the posterior capsule intact. When a posterior capsule tear was observed or when vitreous presented, anterior vitrectomy was performed using an automated portable vitrector (Vitron 2020; Geuder AG, Heidelberg, Germany). In 41 cases a posterior chamber IOL was implanted (25 were in the capsular bag and 16 in the sulcus) and in 2 cases an anterior chamber IOL was implanted. Six children were left aphakic, 5 because of perforating trauma and 1 after blunt trauma. All surgical incisions were closed using 10-0 nylon sutures.

The minimum follow-up period was 12 months (average, 15 months; range, 12-22 months). Complications related to surgery occurred in 7 cases and included 1 case of hypotony associated with retinal detachment, 1 case of IOL fixation for an IOL subluxation, 1 case of aphakic glaucoma needing trabeculectomy, 2 cases of anterior vitrectomy because of pupil opacification, and 2 cases of surgical treatment for posterior capsule opacification (YAG laser was unavailable). Endophthalmitis was not observed.

At presentation, only 5 children (10%) had visual acuity of counting fingers or better. This improved significantly after surgery in 43 children (88%) at the last follow-up visit ($P < 0.0001$ [χ^2]). Average logarithm of the minimum angle of resolution visual acuity before surgery was 2.3 ± 0.04 (hand motions to light perception), improving to 0.98 ± 0.09 (approximately 20/200) postoperatively ($P = 0.0001$ [*t* test]).

The influence of variables such as sex, age, and laterality on final visual acuity was statistically insignificant. Analysis of the effect of trauma mechanism on visual acuity prognosis revealed that patients with blunt trauma were more likely to achieve visual acuity of counting fingers or better than those with penetrating trauma (97% versus 71%; $P = 0.015$ [χ^2]). Final visual acuity in blunt trauma cases was 0.65 ± 0.07 compared with 1.59 ± 0.12 in penetrating injury cases ($P = 0.0001$ [*t* test]). Patients who received an IOL had an improvement in visual acuity from 2.28 ± 0.05 to 0.84 ± 0.08 at last follow-up ($P = 0.0001$ [*t* test]) and were significantly more likely to achieve visual acuity of counting fingers or better (17% versus 98%; $P < 0.0001$ [χ^2]). IOL location did not affect visual acuity results. Better visual acuity at presentation was correlated with better final visual acuity (Pearson correlation 0.56; $P < 0.0001$).

Multivariate analysis was conducted to explore the independent contribution of each factor (which was found to significantly contribute in the single variable analysis). Only mechanism of trauma and the implantation of an IOL were found to influence final visual acuity: blunt trauma ($P = 0.0001$) and the implantation of an IOL ($P = 0.01$) were noted to be related to a better postoperative visual acuity result.

Discussion

This study represents a relatively large series of traumatic pediatric cataract in the rural developing world with a relatively long follow-up period of at least 1 year. In this series, we found that visual acuity of counting fingers or better can be achieved in most children, and blunt trauma is an independent good prognostic factor.

Treating traumatic cataract in children, especially in rural areas of the developing world, poses complex problems. Poor compliance with preoperative and postoperative antiamblyopia treatment, in part because of limited medical follow-up, education, and reinforcement, is a major obstacle to improve visual acuity in the injured eye. Finally, complex anterior and posterior segment injuries (such as retinal detachment, intraocular foreign bodies, and pupil abnormalities) might prevent optimal visual recovery because of lack of proper equipment and trained personnel in dealing with such injuries.

In our series, traumatic cataract was more prevalent in boys than girls. This is consistent with the literature.[6,7,12-14] However, sex as a variable was not found to be correlated with final visual acuity. In our series, only 10% of the children achieved visual acuity of 20/40 or better compared with 34% reported by Staffieri and

colleagues,[13] 35% by Shah and colleagues,[6] 67% by Eckstein and colleagues,[15] and better results by Verma and colleagues[9] and Brady and colleagues.[16] In contrast, in a very large subgroup analysis of 630 cases of pediatric traumatic cataract in Nepal only about 10% of the children (similar to our series) achieved visual acuity of ≥20/40.[7] We speculate that our relatively poor outcome could be because of the fact that our cohort may have suffered from more milieu of injuries overall, and there may have been a longer period between time of injury and time of surgical treatment (not reported here because of unreliable patient information). In the developing world, especially in rural areas, where medical attention is sparse, delay in the treatment of children with ocular trauma is common. In addition, poor communication with children, who often speak only their native language, can result in an inaccurate estimation of their visual acuity. Finally, our relatively long follow-up period permitted recognition of amblyopia and other surgery-related complications.

In our group almost 70% of children were within the amblyogenic age range, that is, of the age <10 years. Some clinicians implement anti-amblyogenic treatment after intraocular surgery even up to the age of 17 years.[17] In our patients, anti-amblyogenic treatment was not used until surgery. After surgery, and although not quantified, it was surely not as vigorously followed as recommended. Nevertheless, it is reasonable to assume that the main culprit for vision deterioration was the structural damage secondary to the trauma and not amblyopia, because all children were aged ≥5 years at the time of surgery (though the exact date of the trauma was unknown in most cases). In addition, the issue of poor compliance is probably a limitation to good visual acuity results in the Western world as well.

We believe that the goals in treating traumatic cataract in rural parts of the developing world must be more "modest" than those in the West. As in previous publications,[10,18] our analysis of visual acuity distinguishes between visual acuity of counting fingers or better and worse visual acuity. In the context of rural Ethiopia, this distinction could mean, in bilateral cases, independence versus the need for constant assistance, having family support versus becoming a socioeconomic burden, and sometimes even survival versus death. Because traumatic cataract is mostly unilateral, this distinction is of major importance if the fellow eye is compromised either by poor vision to begin with or because of future injury or disease. In our series, only 10% of children achieved visual acuity of counting fingers or better in the injured eye at presentation, improving to almost 90% after surgery. In the subpopulation of blunt trauma, almost all children (31/32 [97%]) achieved this goal.

Insertion of an IOL was correlated independently to other factors with good visual prognosis. This is compatible with previous studies.[13] However, the patients that did not undergo IOL implantation were those suffering from more severe trauma, thus making it impossible under local circumstances to insert an IOL. For that reason, we do not consider IOL insertion to be an independent factor for better visual acuity.

The present study is limited by its retrospective nature and the relatively small number of patients. The strength of our study is a relative long follow-up period (at least 1 year in all patients), which is crucial if amblyopia and surgical complications are to be considered and reported. Nevertheless, a 1-year follow-up is still too short to evaluate the contribution of other factors, such as posterior capsular opacity, refractive changes in a growing eye, and the development of complications such as glaucoma.

In conclusion, traumatic pediatric cataract in the rural developing world carries a poor prognosis relative to the developed world. However, when fitting a more realistic set of expectations and outcome measurements (eg, achieving visual acuity of counting fingers or better with a single procedure), results are more encouraging. In this study, we found that blunt trauma corresponds to a better prognosis compared with perforating eye trauma.

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